Towards Greater Diversity in Biodiversity Conservation Action

Exploring the current patterns, barriers, and motivations of young adults' engagement in pro-environmental behaviours with regard to urban biodiversity management in New Zealand.

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"The climate and biodiversity crises, I can't stand by and just let them happen because I want the world to be liveable in the future"
– Survey Participant (18 years old)

Abstract

Young adults have been identified as an under-researched group in terms of their engagement in environmental management initiatives, but an important group to understand given their future role as environmental leaders. Urban planning and environmental management strategies emphasise the importance of engaging the community in kaitiakitanga of the landscape, but young adults are a group that is largely uninvolved. As young adults are soon to be the leaders of biodiversity planning, the aim of this research was to explore young adults' levels of understanding of biodiversity in New Zealand and their patterns of engagement in biodiversity management initiatives, including barriers to and opportunities for engagement.

The methods for data collection included an online survey administered to young adults, and interviews with 11 key informants in volunteering and environmental management sectors. The research revealed barriers to young adults' engagement, opportunities to better involve them in the biodiversity management process, their current engagement in the formal planning process and their relationship with and awareness of biodiversity in general. Seventy-three per cent of young adults knew what the term biodiversity meant and 94% knew biodiversity is under threat. However, 46% had never heard of the biodiversity strategy, and 74% were unaware of their local biodiversity strategies. Key informants from local government identified that young adults are largely uninvolved in the formal planning sphere, from community meetings with the local council to submitting on formal planning documents, and this trend flows into the informal environmental management sector. Survey participants (aged 18-25 years) stated that planning documents were too difficult to read and were more interested in reading an action plan with tangible options regarding how they can help. Their engagement in volunteering was constrained by time and transport, as well as having little faith in the ability of environmental groups to make a difference. A lack of awareness about how they can get involved in local groups, local initiatives or biodiversity management in their home environment was also discovered. Overall young adults preferred the idea of being notified of one-off activities over signing up to an ongoing volunteer group. Despite the barriers, strong latent interest in biodiversity management was found among young adults, with a desire to help, with young adults hoping to be involved in hands-on-action that "actually makes a difference" rather than standing back and watching the state of biodiversity decline. Thus, planners need to take this latent interest and young adults' pro-environmental motivations on board in developing a comprehensive on-the-ground action plan for helping turn young adults

latent interest into action. Recommendations for further action in turning young adults' latent interest into action include:

- Developing better environmental education avenues for young adults who do not study an environmental subject through tertiary education
- Developing a tangible action plan (with SMART goals) underneath city council or regional council biodiversity strategies
- Centralising the ability to engage through an app or volunteer service
- Emphasising the meaningfulness of projects and initiatives to young people

Adopting these recommendations may help planners and environmental groups to better engage young adults in formal biodiversity management and increase their involvement in biodiversity volunteering initiatives.

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1. Introduction

"What we do in the next 20 years will determine the future for all life on Earth"
(David Attenborough, 'Our Planet' Series, 2019)

Young adults are tasked with being the conservation champions of tomorrow (Foley et al., 2018). In just over a decade or two, young adults will be at the forefront of environmental planning policy and decision-making. Despite this, they remain one of the most under-researched groups in terms of their current knowledge, perceptions and engagement levels with nature and biodiversity (Mayo, 2012; Foley et al., 2018). In recognising that young adults play an essential role in the future management of biodiversity, it is vital to understand their current awareness of biodiversity and engagement in environmental planning. According to Novacek (2008), acquired knowledge of a subject influences subsequent attitudes and behaviour. Thus, it is crucial to explore young adults' understanding of biodiversity loss, especially as it may influence their willingness to engage in pro-environmental behaviours such as native planting and pest management. Obtaining a greater understanding of young adults' knowledge and awareness of biodiversity, as well as their engagement patterns in biodiversity management, will contribute to a deeper understanding that will inform the activation of this age group in future biodiversity management initiatives. Within this research, 'young adults' are people aged 18 to 25 years. This group was selected because they are projected to be the future leaders and decision-makers for environmental management (Foley et al., 2018).

1.1 Setting the scene: The current state of biodiversity and urban biodiversity management in New Zealand

"The green of a kākāpō feather, scarlet pōhutakawa, summer cicada song, and a dolphin's silver flash – these are the colours and sounds of our Aotearoa New Zealand"

-Environment Aotearoa (2019: 8)

The above quote illustrates the intrinsic value of nature for New Zealanders. As an isolated island mass, New Zealand is home to unique indigenous biodiversity that holds significant cultural, social and environmental values for those who live there (Environment Foundation, 2016). The kiwi holds its place as New Zealand's national icon, and an alternate name to those who identify as New Zealanders, and the native ponga (silver fern) is the national symbol. Despite native biodiversity being a central part of New Zealand's identity, biodiversity management is under-resourced and fragmented, leaving it vulnerable to the changing state of the environment. Māori are Tangata Whenua, with a special connection to the land and the biodiversity of our native habitats. The government appoints the Department of Conservation as the dedicated guardians of New Zealand's biodiversity. However, despite the Department's significant role in protecting our taonga species, it has experienced years of funding loss and a myriad of changes to functioning which have significantly reduced its ability to operate effectively to counter biodiversity loss (Ruru et al., 2017).

Biodiversity is commonly only imagined as plentiful in conservation estates, thus only essential to preserve in these areas. However, cities in New Zealand are also home to rich ecosystems. Unlike conservation estates, urban biodiversity has been the focus of too few resources and projects by DOC. Rather the responsibility of biodiversity management lies in the hands of regional and local councils. There is also a common misunderstanding surrounding the value of conservation activities in urban space. The Environment Aotearoa (2019) report by the Ministry for the Environment provided harrowing details on the state of biodiversity in New Zealand, claiming that before human arrival to New Zealand, 80% of the land was forest cover, but today only a third of the original native forest remains (Environment Aotearoa, 2019). Since humans arrived in New Zealand, 75 plant and animal species have become extinct. Ninety percent of our sea birds are at risk of extinction, and 90% of our wetlands have been lost. Across all plant and animal classifications the status has worsened for 86 species in the last 15 years (Environment Aotearoa, 2019; Cullen et al., 2016). This loss of biodiversity will be felt

by New Zealanders through people's decreasing sense of connectedness to the land and identity with nature. Ecosystem services are essential to people.

For indigenous Māori, there is a deep and interconnected relationship between people and nature that feeds into resource management, which differs from euro-centric management approaches (Harmsworth and Awatere, 2013). Te ao Māori (Māori worldview) acknowledges an equilibrium of the natural environment and society, such that when part of this relationship shifts, the environmental system becomes out of balance. It also acknowledges that humans are biophilic entities and rather than separated from the natural environment they are intrinsically linked to it. This linkage is reflected in te rēo Māori as in 'whenua' meaning both earth and placenta (Harmsworth and Awatere, 2013). Mātauranga Māori (Māori knowledge) forms the basis of te ao Māori and thus governs decision-making with regard to environmental management (Harmsworth and Awatere, 2013). Within the Resource Management Act (1991), all are required to give effect to the Treaty of Waitangi. Giving effect should allow Māori to exercise kaitiakitanga and be partners to decision-making regarding the natural environment. It requires planners to consult with iwi and to collaborate and work together on decisions regarding the state of the environment (Resource Management Act, 1991). Weaving te ao Māori into environmental decision-making and management initiatives involve giving back natural elements that are taken from the environment and enhancing the life-supporting services. With this understanding of te ao Māori and mātauranga Māori, it is understandable that a young adult of Māori ethnicity may have a different relationship with nature and perspective of biodiversity management practices compared to a New Zealander from another ethnicity.

1.1.1 A look at urban biodiversity

In 2018, some 86% of New Zealanders lived in cities, that is, around 4.2 million people, and that number continues to grow (Statistics New Zealand, 2018). With this population growth has come urban sprawl and the creation of subdivisions and lifestyle blocks on the periphery of these centres, which continue the loss and fragmentation of natural habitats (Statistics New Zealand, 2018; The Environment Aotearoa, 2019). Within urban environments, the increasing amount of hard landscaping has led to the removal of indigenous vegetation, exotic species have replaced natives, and natural water bodies have been re-routed. Not only does hard landscaping remove natural habitats, but it increases urban run-off into waterways, which can cause pollution and habitat loss for marine biodiversity (The Environment Aotearoa, 2019).

Household pets (such as cats) are more prominent in urban and peri-urban environments, and are a significant threat to native species, adding to the already high pest numbers. Biodiversity faces several threats in urban landscapes, from introduced pests to hard landscaping. However, if these spaces are managed through biophilic-centred design and active community engagement, cities can act as safe havens for biodiversity and aid in increasing species' numbers (Freeman, 2005).

As stated by Hostetler et al. (2011) it is difficult to define and assign a value to urban biodiversity. It is much easier to direct conservation planning towards wilderness landscapes and national parks. Biodiversity is often associated with wilderness landscapes but is also an essential aspect of any healthy city. Urban ecologists, conservation biologists, urban planners and residents all have different understandings of what biodiversity means within a city environment (Nilon, 2011). Biodiversity and urban ecology hold different cultural, social or ecological values to different people; no one is more important than the other. A scientific perspective of biodiversity and ecology may be based on a particular set of values that may differ from those imagined through a cultural lens. From a human-centred assessment, Botzat et al. (2016) emphasise the importance urban biodiversity has in delivering vital ecosystem services to enhance human wellbeing in urban environments. Despite this recognition, New Zealand biodiversity plans and policies, such as the National Biodiversity Plan and the Resource Management Act (1991), have often overlooked the importance of urban biodiversity and lacked enough relevant direction towards its management (Freeman, 2005). While there is a large body of research that supports the need for biodiversity in urban environments, research exploring the extent to which the public engage with urban biodiversity or understand the importance of maintaining and enhancing it remains scarce (Botzat et al., 2016). There is especially a lack of information on demographics for specific age groups or cultural groups, regarding their views on urban biodiversity and its management (Botzat et al., 2016).

1.2. Research context: Young adults and urban biodiversity management

As stated by Nilon (2011) "successful urban biodiversity management does not come from the development of tools and the application of these tools [by researchers and planners], the key lies within the success of engaging people whose everyday decisions and actions impact biodiversity at different scales" (p. 50). While there is substantial research that delves into the ways that adults (general) and young children engage in environmental behaviours, there has

been little exploration into the ways that young adults engage and reasons why they are likely to engage in pro-environmental initiatives. Some research has looked at the ways young adults understand and value biodiversity, and Nisiforou and Charalambides (2012) were able to draw some conclusions around how levels of education on biodiversity can impact willingness to engage. It is vital to know if young adults are engaging in these initiatives, given the fact that they are to be leading planning direction in the future (Arbuthnott and Devoe, 2013). They also make up a large part of the urban population, whether they are renting, homeowners or studying at tertiary institutions, so it is essential to look at ways they can be involved in changing the fate of urban biodiversity.

Previous research on human-nature connectedness has centred on the relationship between children, teens and older adults and the natural environment, but little research has explored the relationship between young adults and urban biodiversity. Human-nature connectedness is defined by an individual's level of emotional connection to the natural world, which if high can be a strong predictor of pro-environmental behaviour (Mayer and Frantz, 2004). Young adults between the ages of 18 to 25 years are an environmentally mobilised population group in urban environments in New Zealand, especially evident through the 2019 climate change movements. Therefore, it is vital to understand their motivations, understanding, priorities, interests and engagement habits regarding New Zealand's biodiversity. Previous research that has centred on young adults and environmental participation highlighted that the university population of young adults were likely to be future leaders of biodiversity strategies, thus they must be given the ability to engage in meaningful action and have access to education on biodiversity (Foley et al., 2018; Arbuthnott and Devoe, 2013). Arbuthnott and Devoe (2013) found that young adults, in Canada, who had done a biology course had a more comprehensive understanding of terms and more positive association with biodiversity. For those who had not, there was a lack of confidence surrounding the meaning of biodiversity, lack of knowledge on threats, but a general awareness that humans had caused problems (Arbuthnott and Devoe, 2013). Although this group of students knew humans played a part in the problem, they were not able to answer why this was so.

"Engaging urban residents as active participants in the conservation and management of urban biodiversity requires the recognition of the range of experiences that they have with the species and habitats they encounter, the diverse and sometimes conflicting information concerning biodiversity that they receive and the multiple ways that they value biodiversity. It is also

important to recognise the broader context within which urban residents view specific management or conservation actions" (Nilon, 2011: p.50). Therefore, in looking at young adults' engagement trends in biodiversity management initiatives, it is crucial to identify the experiences they currently have in urban nature. It also essential to explore the levels of knowledge they have on biodiversity (both from formal education and informal learning) and the ways that they perceive current management strategies. Exploring these with the addition of more direct data (relating to their input into environmental groups or awareness of biodiversity problems) will help construct an idea as to why some young adults are not engaging and how planners may be able to counter these problems.

Research on young adults and their motivations and barriers to engaging in environmental initiatives is limited. However, it is known to be an important area to understand, as councils and volunteer agencies can take this information on board when constructing engagement platforms for new environmental initiatives and increase participation numbers and long-term contributions. Engaging in environmental initiatives such as habitat management not only have proven benefits for many species but also it has proven direct benefits for people through increasing their health and wellbeing, commonly known as cultural ecosystem services (CES). While some people respond better to engaging in conservation initiatives that highlight the benefits for the environment, others respond better to initiatives that highlight the social and cultural benefits (Sterling et al., 2017). The feeling of giving back to nature, fulfilling a sense of duty and making new friends are among a few of the socially-motivating factors to public engagement in conservation initiatives. In terms of age, there are few statistics. A study by Peters et al. (2015) stated that 53.7% of members of community environmental groups in New Zealand are between 51 – 65 years old, with only 4.7% of group members aged between 19 and 30 years. A study by Olsen et al. (2018), in the United States, looked at the demographics of community members who participated in flood risk-management meetings and found that those aged 18 to 44 years were poorly represented. Those aged 18 to 20 years experienced problems in showing up due to a lack of transport options as well as this age group being more likely to be in the early stages of their career. This meant they had less flexibility in scheduling time off. Olsen et al. (2018) also hypothesised that a high proportion of young adults were in temporary housing while at university, which contributed to not caring about local environmental action as it is perceived not to be worth their investment. Exploring young adults' motivations for biodiversity management and the potential barriers they face in being involved in environmental planning processes and activities will be beneficial for volunteer

coordinators, environmental planners and conservation agencies as well as add to existing research on understanding people's relationships with the natural environment.

1.3. Planning Context

New Zealand's natural environment is defined by unique birds and landforms and diverse landscapes of forests, beaches and lakes. Whether it be for its resources or its beauty, New Zealand's biodiversity is an asset for the economy, society, culture and the environment. Thus, ensuring it is managed sustainably is essential for many different groups as well as for the future sustainability of natural ecosystems.

A review of current plans and policies aimed at increasing on-the-ground action needs to be measured against the many different values the public have regarding biodiversity. This analysis may help to improve the avenues through which the public can get involved in biodiversity management, by comparing current action plans with public aspirations concerning involvement. It is possible that young adults will have different motivations to engage than older adults. Thus, it is essential to look at the roles every group in society can play and how their motivations can be acted on to encourage better management. Environmental action commonly falls into the hands of a few in society, those who are naturally environmentally inclined or those who have access to environmental education. There is no set strategy to help authorities to engage those who do not have a natural inclination to engage in pro-environmental behaviour. For urban biodiversity management to be successful in the long-term, all community members must be pro-active in taking care of the natural environment. This collective effort can contribute to a more seamless long-term operation between individual action, community initiatives and national planning goals. However, the integration of all efforts is limited without an overarching shared vision that can be adopted by individuals, communities, volunteer agencies, environmental groups and local government. For most of the time, agencies at the community level will not be working under national biodiversity objectives; rather, they will be working towards smaller-scale goals.

> *"What is required is a stronger and clearer leadership and coordination of effort at a national level; better support for landowners and managers; alignment and coherence of policies and institutions of government; and improved knowledge, monitoring and compliance."* – The Biodiversity Collaborative Group (2018: 4).

Figure 1: Diagram showing the different statutory layers of biodiversity management in New Zealand

The Resource Management Act (1991) is New Zealand's key planning legislation and the primary legislation for managing biodiversity in the environment. It requires planners to safeguard the life-supporting capacity of ecosystems, identify areas of significant indigenous vegetation and habitat of indigenous fauna, and to maintain biodiversity. While this may work well in a conservation estate, it is hard to apply these directly to safeguarding biodiversity in urban environments or predominantly "man-made" spaces. The Resource Management Act (1991) requires decision-makers to safeguard the life-supporting capacity of ecosystems, the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (Section 5(2)(b), Section 6(a) and Section 6 (b)). The Resource Management Act (1991) must be followed; it gives both regional councils and district councils a responsibility to look after biodiversity. National and Regional Policy Statements then follow underneath the Act, which directly informs regional and district plans for biodiversity management.

The Biodiversity Collaborative Group (2018) is a stakeholder-led group established by the Minister for the Environment. They are currently working on a National Policy Statement (NPS) to address the state of New Zealand's indigenous biodiversity. The Biodiversity

Collaborative Group (2018) argue that the current state of biodiversity loss has been the result of human impacts upon nature. These human impacts have resulted in the loss of around 71,000 hectares of indigenous habitats across the country, and 80% of native birds, 88% of lizards, and 100% of frogs are under threat of becoming extinct (The Biodiversity Collaborative Group, 2018). The Biodiversity Collaborative Group (2018) claim that better strategic direction is needed to ensure that indigenous biodiversity living outside of protected areas can thrive. They further argue that the current national policy framework for this effort is not comprehensive or robust. National Policy Statements have statutory weight and must be followed by regional and local authorities through their plans.

1.3.1 The Convention on Biological Diversity and New Zealand Biodiversity Strategy

Twenty-six years ago, the UNEP Convention on Biological Diversity (1993) was signed, which asked countries to take a stand to halt biodiversity loss. The three main objectives of this convention are the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising from the utilisation of genetic resources. The New Zealand Biodiversity Strategy (NZBS) (2000-2020) is the strategy created as a requirement to New Zealand's commitment through ratifying the Convention of Biological Diversity (1993). The NZBS is a framework for action to halt the decline of indigenous biodiversity. Thus far, it has been successful with only certain species, as there is still a large amount of decline. The term of the current strategy ends in 2020, with a new one coming into effect in December of 2019. In June of 2019, a discussion document was released for formal consultation with the public, giving them a chance to make submissions on it. A biodiversity strategy for New Zealand is vital because of New Zealand's international position and expectations, national commitments, local efforts and for future generations (DOC, 2000). It states that while the strategy is government-led, help is needed from land managers, resource users, iwi, hapu and the wider public. "It will be the changes in the day-to-day practices of all New Zealanders that will determine our record in biodiversity management…the involvement of a wide spectrum of society in implementing the New Zealand Biodiversity Strategy is vital for its success" (Biodiversity Strategy, 2000: 11). The current New Zealand Biodiversity Strategy outlines four main goals for managing New Zealand's biodiversity as follows (Table 1).

Table 1: The four goal headings of the New Zealand Biodiversity Strategy (2000-2020).

Goal	Title	Description
Goal One	Community and individual action, responsibility and benefits	Enhance community and individual understanding about biodiversity, and inform, motivate and support widespread and coordinated community action to conserve and sustainably use biodiversity.
Goal Two	Treaty of Waitangi	Actively protect iwi and hapu interests in indigenous biodiversity and build and strengthen partnerships between government agencies and iwi and hapu in conserving and sustainably using indigenous biodiversity.
Goal Three	Halt the decline of New Zealand's indigenous biodiversity	Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy, functioning state, enhance critically scarce habitats and sustain the more modified ecosystems in production and urban environments.
Goal Four	Genetic resources of introduced species	Maintain the genetic resources of introduced species that are important for economic, biological and cultural reasons by conserving their genetic diversity.

Over the last 19 years, Goal One of this strategy has sought to enhance community and individual understanding of biodiversity and support widespread community action to conserve and sustainably use biodiversity. This study looks at young adults who have grown up with the current biodiversity strategy in place or coming in to effect. The current 18 to 25-year-olds should have been educated in a way that enhances their understanding of biodiversity and nature from a young age. In explaining this goal, the Biodiversity Strategy declares "we all have an interest in, and responsibility for helping to conserve and sustainably use biodiversity" (2000: 7). It recognises that communities and individuals are the powerhouses of positive change and that their actions to conserve biodiversity depends on an adequate understanding of biodiversity, information, motivation and support. Unfortunately, while the plan does mention urban biodiversity under Goal Three, it fails to recognise how urban biodiversity may be best preserved. It does not include information on how urban residents can enhance biodiversity in their gardens and how communities can work to enhance local government action. Overall, the Biodiversity Strategy is ambitious in its goals, however, it is too difficult to measure progress due to a lack of sufficient ongoing monitoring and reporting frameworks. Areas of significant biodiversity are still seeing a rapid loss, evidence of a failure to manage them effectively.

1.3.1.1 The proposed Biodiversity Strategy 'Te Koiroa o te Koiora'

On the 22nd of September 2019, the consultation period for the next New Zealand Biodiversity Strategy ended. The current Biodiversity Strategy ends in 2019, with Te Koiroa o te Koiora to take biodiversity management direction from 2019 over the next 50 years. One of the main ideologies of 'Te Koiroa o te Koiora' is that humans are a vital part of nature and that restoring the connection between people and nature is vital for the future management of biodiversity. This ideology is not a central component of the current biodiversity strategy. Within the document, it is noted that the value of biodiversity is not currently reflected in decisions around resource use. The poor inclusion of biodiversity valuations in decision-making was put down to a lack of knowledge and awareness surrounding the cumulative impacts of small decisions on matters that affect biodiversity. Economic outcomes are the end-goal of current decision-making frameworks but need to account for the value of biodiversity, something that cannot be valued through monetisation. The strategy sets a vision for all people to work towards and mentions the importance of communicating the strategy effectively across all groups in New Zealand's diverse society.

A key aim of the new strategy is to provide direction and guidance and contribute to the global response to biodiversity decline (Department of Conservation, 2019). Rather than focusing mainly on government action, the strategy is proposed to focus on igniting action and long-term behaviour change in New Zealand. Like most strategies, the on-the-ground action underneath this strategy is to be guided by local, district and regional plans, legislation and National Policy Statements. The proposed strategy outlines system shifts needed to achieve the long-term outcomes; shift three is relevant to this research. Shift three focuses on "empowering communities to take action" and states that all New Zealanders should be empowered to be 'stewards of nature', conserving, managing and using it wisely (Department of Conservation, 2019). Figure 2 shows the kind of stakeholders proposed to look after biodiversity.

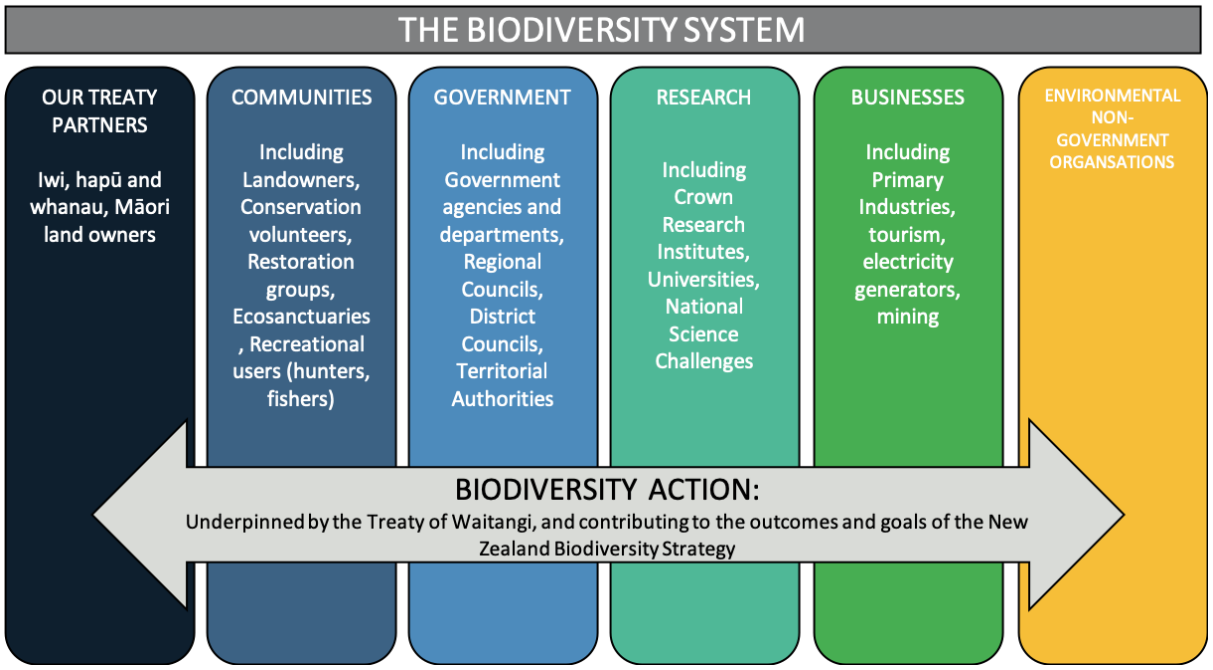

Figure 2: Stakeholders that should be engaged in biodiversity management (taken from Department of Conservation, 'Te Koiroa o te Koiora', 2019)

This research is specifically looking at young adults' involvement in the community sector (as conservation volunteers, part of restoration groups and eco-sanctuaries). It also looks at their involvement in formal planning structures such as input into government plans through submitting and contributions to local councils. While young adults between the ages of 18-25 years make up a small group of the general population, they are still a large part of many communities and are just as important to engage as children, teenagers, adults and older adults.

1.3.1.2 The Biodiversity Action Plan 2016-2020

The New Zealand Biodiversity Action Plan was first released in 2000 along with the New Zealand Biodiversity Strategy but was updated in 2016. As it currently stands the New Zealand Biodiversity Action Plan (2016-2020) aims to put the strategy into action with further goals. Goal A is to mainstream biodiversity across government and society through their National Target 1, which is to enrich people's lives through connections to nature. Within National Target 1, the strategy seeks (by 2020) to have 85% of New Zealanders visit public conservation lands and waters at least once a year (DOC, 2016). They mention "Kids Greening Taupo" as a programme that enriches children's lives through connection to biodiversity action that may lead to a deeper connection as a young adult. National Target 2 seeks to have people taking more significant action for nature. The Department of Conservation was to do this through leveraging partnerships, supporting on-the-ground projects and raising the baseline capability

of the community's voluntary contributors to increase their effectiveness. The reporting series under National Target 3, which is "integrating biodiversity into national and local strategies, policies plans and reporting" has been achieved with the implementation of the new national environmental reporting series "Environment Aotearoa". The Environment Aotearoa series provides vital information about the state of biodiversity in New Zealand as it stands, why it is like that and how it affects New Zealand's economy and society. This reporting is essential for the public and is currently gaining a large amount of media attention through online newspapers and social media. National Target 14 seeks to ensure that the benefits of biodiversity and ecosystems for people's health, and economic, social and cultural wellbeing is better understood and received. Under National Target 14, DOC seeks to make people more aware of the benefits nature has for the health and wellbeing of people and hope that people will be actively seeking out more natural spaces. National Target 15 is also essential in terms of connecting biodiversity management and people. It hopes to create better ecosystem and biodiversity outcomes through facilitating greater collaboration, coordination and integration. Part of National Target 15 is to provide greater support to partnerships focused on landscape-scale conservation on both private and public land.

What this action plan is lacking is that there is no guidance on how best to engage the public to increase education and to increase people's desire to visit National Parks. Also, when identifying the goal of wanting to enrich people's lives through connecting people to nature, no action statement refers to how this can be executed in urban spaces where the majority of New Zealand's population resides. There is mention of children's programmes that were put in place such as 'Kids Greening Taupo', but nowhere does it mention groups or national projects targeted at other age-specific groups.

1.3.2 Other key legislation, policy, plans and strategies

1.3.2.1 National legislation and strategies

The regulatory framework for biodiversity management is very complex, with several different legislative documents such as the Conservation Act (1987) and the Wildlife Act (1953). The Conservation Act (1987) is an integral piece of legislation that determines the Department of Conservation's work, setting out their conservation functions and responsibilities. Specifically, the Conservation Act was created to "promote the conservation of New Zealand's natural and historic resources" (Department of Conservation Website n.d.). The Wildlife Act (1953)

outlines the protection and control of wild animals and birds and the management of game and is the primary legislation for species protection. In addition to legislation, legal protection is applied in specific areas such as marine reserves and conservation estates. Biodiversity must also be protected on private land and urban environments, but there are few tools to ensure the protection of biodiversity in these realms. Biodiversity management at current is disjointed from the national to the local level; it is under-resourced and fails to be enforced to enhance biodiversity management outcomes.

The Environmental Education for Sustainability Plan (2017 – 2021) sets out points to guide communities and individuals on how to grow their understanding, work together, work as kaitiaki, and advocate for a healthy environment and society. This plan developed Te Taha Wairua – a model for achieving pro-environmental action and behaviour in communities. One of the visions of the plan is to have all New Zealanders value a connection to the environment. Other plans and campaigns also exist. The War on Weeds campaign, supported by DOC's Community Fund, is a nation-wide campaign to encourage the eradication of noxious weed species threatening native biodiversity. Predator-Free 2050 is a national strategy that aims to rid New Zealand of introduced predators that threaten the country's taonga, threatened and endangered species. The Predator-Free 2050 initiative has been successful thus far in bringing together central and local government, community environmental groups, landowners and iwi. Other examples include the kiwi recovery plan 'living water' (DOC and Fonterra) plan, and biosecurity direction statement 2025. As found by Cullen et al. (2016), it is unlikely that the public is reading these plans. This fact was indicated by data that highlighted significant knowledge disparity between the public and the actual state of the environment (Cullen et al., 2016). One of the significant differences between public perceptions of biodiversity and scientific accounts was to do with its state. The general public rated it as "good" when policy, action plans and strategies outline that this is not the case (Cullen et al., 2016).

1.3.2.2 Regional Plans and Young People

Regional plans are required to bring the direction of the New Zealand Biodiversity Strategy identified in national biodiversity management objectives to particular regions. These strategies place biodiversity problems into a localised context and are more likely to be viewed by the public than the National Biodiversity Strategy as they are place-specific. Three New Zealand regions (Waikato, Wellington and Otago) have widely different plans and responses

to public participation. These three plans were examined as they have the most relevance to the population group due to their large student populations of young adults aged 18 to 25 years.

Waikato Regional Council's (WRC, 2016) biodiversity strategy 'Source to the Sea' looks to better engage stakeholders and the general public in its 'Project Tohu', which seeks to grow collective capacity to enhance indigenous biodiversity and to restore ecosystem processes in a coordinated network of natural area regeneration. Within the engagement process, the WRC found a gap in survey responses from those under 35 years of age, and in response, an online survey was put out to rectify the gap. The WRC also found that supporting grassroots initiatives and the local ownership of biodiversity initiatives was the best way to encourage restoration and biodiversity enhancement on private land. The idea of giving people ownership of a project to increase engagement follows several place-attachment theories. The need to find alternative ways to engage young adults was shown in this case, with such low levels of participation by this age group. However, throughout the remainder of 'Source to the Sea', young adults were not further mentioned.

In the Greater Wellington Regional Council's (GWRC) biodiversity strategy, goal three is that 'people understand and value biodiversity and ecosystems'. The GWRC recognises that they cannot achieve their biodiversity management visions without the support of the public. Specifically, the GWRC mentions that public knowledge and awareness of ecosystems and threats towards them is vital. The strategy also recognises biodiversity as a significant part of Wellington's heritage, as well as vital for the provision of ecosystem services. By sharing information and enhancing knowledge avenues, the GWRC hopes that this will "influence others to protect and restore biodiversity on land they own or manage in the Wellington region" (GWRC, 2016: 15).

The Otago Regional Council's (ORC) biodiversity strategy is called 'Our Living Treasure | Tō tatou Koiora Taoka' (2018). One of the guiding principles is that management is co-led by communities with co-ordinated outcomes. Through this principle, the ORC seeks to achieve greater public awareness of and pride in Otago's biodiversity. To achieve the outcome of greater public awareness, the ORC (2018) states that education and information sharing is vital. In that, the ORC will provide information on biodiversity to the public, support education programmes on biodiversity and develop an online platform for information-sharing on biodiversity. Thus far, an online platform has not been developed; however, this is not to say

it will not happen in the future. The plan mentions there are over 70 environmental restoration groups currently operating in Otago (Otago Regional Council, 2018).

1.3.2.3 City Plans and urban biodiversity goals

The Biodiversity Collaborative Group (2018) state that one of the goals for urban biodiversity restoration is that cities' should have at least 10 per cent of indigenous vegetation cover. This statistic has been developed from objective 3.2 of the proposed National Policy Statement on Indigenous Biodiversity (NPSIB), i.e., "enhance the sustainability of indigenous biodiversity depleted environments through the restoration and reconstruction of a representative range of indigenous vegetation and habitats" (The Biodiversity Collaborative group, 2018: 35).

In Hamilton, the City Council (HCC) does not have a strategy dedicated to biodiversity management in general. The absence of city biodiversity strategies is typical for New Zealand's city councils as the responsibility of biodiversity management lies within the regional authorities. However, biodiversity is encompassed within the HCC's ''environmental sustainability strategy''. The environmental sustainability strategy does not address urban biodiversity to a large extent. Instead, it brushes over the importance of biodiversity and briefly mentions gully restoration programmes that are to help with urban biodiversity restoration. An in-depth gully restoration programme is facilitated through the Hamilton City Council, where they have partnered with the Waikato Biodiversity Forum, Eco-Sourced Waikato and Weedbusters to educate on the importance of biodiversity and work to restore gully ecosystems in the city (Hamilton City Council, n.d).

The Dunedin City Council (DCC) Biodiversity Guide is much more in-depth concerning its aims for enhancing biodiversity in Dunedin. ''Educating and informing" and ''sharing responsibility'' were two areas highlighted as critical challenges. Under "educating and informing'' it identifies that the community is best placed to conserve indigenous biodiversity in Dunedin, and that to be a part of this community, people need to be educated. It was noted that this requires the DCC to provide better opportunities for the public to participate in community biodiversity enhancement initiatives and improve access to information (Dunedin City Council, 2007). The recently established ''Wild Dunedin Festival'' (2019) provided avenues for public education on biodiversity, with great success. The festival aimed to target all age groups with a range of different activities. In the Dunedin City Council Biodiversity Guide, there is no mention of the large student population and how they may be able to help,

which excludes a large population group that may not identify with a 'community' due to their mobile nature and rented accommodation. Wellington City Council's (WCC) biodiversity plan focuses on urban biodiversity goals and creating a haven for biodiversity in the city. It discusses the importance of biodiversity for the city's natural capital. It also emphasised the importance of having urban dwellers interact with urban biodiversity. The WCC further states "People in Wellington are increasingly aware of our indigenous biodiversity, but often this isn't translated into action" (Wellington City Council, 2015: p.28).

1.4 Research Aim

Given that the enhancement and protection of indigenous biodiversity is important in urban areas, and that community involvement is essential to enhance biodiversity, groups in society that are under-researched in terms of their engagement patterns in biodiversity management initiatives need to be explored, to understand how they may or may not be activated. This research examines the engagement of young adults in urban biodiversity management initiatives. It adds to a limited body of research on young adults and their understanding of biodiversity and participation in biodiversity planning initiatives. While low participation is a feature of several population groups in society, this research focuses on 18 to 25 year-olds. Young adults are an under-researched group, but are a significant group to understand in terms of their knowledge and engagement patterns, especially as they will soon be leading the biodiversity agenda and will face the most pressure in combatting biodiversity loss compared to prior generations (Arbuthnott and Devoe, 2013). According to Novacek (2008: p. 11572), "any engagement strategy must start with knowledge of who is being engaged and what they already know and do not know". Thus, this research aim is twofold, and as follows:

The research aim is to explore young adults' levels of understanding of biodiversity in New Zealand and their patterns of engagement in biodiversity management initiatives, including barriers and opportunities to their engagement.

1.5. Research Questions

Three research questions were devised to guide this study and address its aims. They are explained below with a brief justification for each question, including insights into what each question seeks to achieve within the wider study.

- **Research Question One:** To what extent are young adults aware of urban biodiversity?
- **Research Question Two:** What are young adults' understanding and awareness of the biodiversity planning process and strategies to enhance biodiversity?
- **Research Question Three:** In what ways and to what extent are young adults currently engaging with urban biodiversity, what are the barriers and the opportunities to better engaging them?

The information collected from these questions can be used to improve biodiversity planning and conservation initiatives in New Zealand. Understanding the extent that young adults are aware of urban biodiversity (and biodiversity management) will help to assess how effective our current environmental education is. It is crucial to see if young adults know about international, national and local management strategies, as these are documents made not only for decision-making bodies but also for the general public to know what is going on. However, plans are not always written in a way that is accessible to all groups in society. Thus, it is critical to determine whether young adults can access plans aimed at the general public or identify if they are a notably excluded group. Identifying the ways and extent to which young adults are engaging in urban biodiversity management gives a clear idea as to whether all parts of the community are engaging or just some. Young adults make up a large group of the urban population and thus, it is vital to understand how, and to what extent, this group is involved. Understanding the barriers that young adults face in getting involved in initiatives can give planners greater insight into how biodiversity strategies can be improved. Especially when catering to a multi-faceted society that includes groups facing multitudes of barriers. If public motivations to engage in pro-environmental behaviour are better understood by environmental planning bodies, it can enhance on-the-ground action, especially if these motivations are weaved into guiding engagement strategies.

Research Question	How this may improve biodiversity planning
1. To what extent are young adults aware of urban biodiversity	Participants' answers to questions regarding their level of understanding of biodiversity, urban biodiversity and biodiversity planning will help planners assess young adults' ground level of knowledge and whether this impacts willingness to engage or not engage.
2. What are young people's understanding and awareness of the biodiversity planning process	Looking at the levels of engagement young people have with statutory biodiversity documents aimed at guiding biodiversity management will allow us to see the level to which they are participating in planning

and strategies to enhance biodiversity?	processes surrounding the environment and if it needs to be improved or not.
3. In what ways and to what extent are young adults currently engaging with urban biodiversity and what are the barriers and opportunities to better engage them?	In looking at the ways which young adults engage and the extent to which the majority do we can find potential patterns that may be worth noting. Looking at the barriers young adults may face in participating in biodiversity management may help to better tailor strategies to account for these. Identifying opportunities to better engage this age group may help local government and environmental groups revise their outreach and engagement processes to better involve this group.

1.6. Methodology Overview

The full breakdown of the methodology used to conduct this study is outlined in Chapter Three. The primary method used was an online survey that was distributed at two major universities in New Zealand; Waikato University in Hamilton and the University of Otago in Dunedin. The online survey was also released on social media, which made the survey available to students from other universities across New Zealand. The online survey consisted of 57 questions and sought to understand students' levels of awareness of biodiversity, their understandings of the importance of biodiversity, their current engagement patterns, motivations to engage and barriers to their engagement in biodiversity management. In total, 286 individuals between the ages of 18-25 years participated in the survey. Eleven key informant interviews were conducted with significant biodiversity management bodies, local councils and student environmental groups. The majority of key informants were located in Dunedin, with some in Wellington and one in Christchurch.

1.7. Thesis Structure

This thesis begins with Chapter Two, providing an overview of the current research on engagement patterns, challenges to public engagement, perceptions of biodiversity and nature and systemic biodiversity management. Chapter Three then provides a detailed discussion of the methods used to collect data in addressing the research questions, as well as a justification of the methodological approach. Chapter Four addresses Research Question One, by presenting and discussing the results on young adults and their awareness of biodiversity and biodiversity loss. Chapter Five addresses Research Question Two, by presenting and discussing the results

on young adults input and awareness of biodiversity plans and strategies and their engagement in formal planning processes. Chapter Six addresses Research Question Three, by presenting and discussing the results found on young adult's engagement patterns in biodiversity management activities, barriers to their engagement and opportunities to better engage this population group in biodiversity management. Finally, Chapter Seven will conclude the research and provide recommendations for future research.

2. Literature Review

Substantive research on public understandings of biodiversity is still largely deficient as it often overlooks the relationship between people's understanding of biodiversity and their actions and decisions (Novacek, 2008). Furthermore, research on young adults' understandings of biodiversity and their perceptions of biodiversity management is poorly understood, especially within the context of urban New Zealand. There is also a limited body of research on young adults and the patterns of their engagement in biodiversity management initiatives, including why they do or do not get involved. In recent literature, public engagement research has been redirected towards developing a greater understanding of the relationship between peoples' understanding of biodiversity and biodiversity management, as well as how levels of knowledge on biodiversity may influence one's likelihood to engage in nature management activities.

Furthermore, there has been a body of research developed that has started inquiring into the ways biodiversity strategies and management practice may be deterring people's engagement (Fischer and Young, 2007; Navarro-Perez and Tidball, 2012; Asah et al., 2014; Sterling et al., 2017), such as developing strategies without having a deep understanding of people's predisposed relationships with biodiversity and nature and their motivations to engage. An examination of the many factors that motivate, facilitate or deter young adults from participating in biodiversity management processes will help establish better strategies for engaging this age group.

This chapter starts with an overview of the terms "biodiversity" and "engagement", before discussing the literature surrounding the importance of urban biodiversity and green spaces in urban environments. Key topics surrounding biodiversity are then explored, such as public awareness of biodiversity and young adults' awareness specifically, the importance of public engagement in biodiversity management, volunteering trends and challenges to engaging the public in environmental initiatives. Lastly, it reviews the literature on policy implementation and public engagement, which informed this research.

2.1 Defining biodiversity

The Convention on Biological Diversity (1993) defines biodiversity as the "variability among living organisms from all sources including *inter alia*, terrestrial, marine and other aquatic

ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (Foley et al., 2018). Similarly, within the Resource Management Act (1991) biodiversity (or biological diversity) is defined as "the variability among living organisms, and the ecological complexes of which they are a part, including diversity within species, between species, and of ecosystems". For this research, the definition of biodiversity used is sourced from the Resource Management Act (1991) as it is New Zealand's primary resource management legislation, and this research is embedded in a planning framework through understanding avenues of enhancing public participation in environmental planning initiatives.

2.2 Defining public engagement in biodiversity management

Novacek (2008) describes the word "engage" as one that means many things, including the development of meaningful connections with others, bring into association or aid, to attract, hold, or draw others into some agreed-upon action or service. Pro-environmental behaviour (or environmental engagement) can take different forms and therefore encompasses a rather diverse set of activities or ways of engaging (Buta et al., 2014). Buta et al. (2014) reference the environmental citizenship classifications developed by Stern (2000). These include environmental activism, environmental citizenship behaviour that is non-activist in the public sphere (such as signing petitions and being a part of environmental groups), private sphere environmentalists (such as choosing green consumerism and watching energy use), and individual behaviours (such as entrepreneurs designing more environmentally friendly products). As this research is exploring the extent to which young adults engage in biodiversity initiatives, engagement needs to be clearly defined. In this research, engagement in environmental initiatives is defined as involvement (either active or passive) in the management or restoration of green space and pest reduction activities with the goal of re-establishing native habitats for biodiversity to thrive.

2.3 Biodiversity in cities: The importance

A plethora of research discusses the importance of having rich biodiversity in urban environments as it is vital to human health and wellbeing (Hedblom et al., 2014; Goddard et al., 2009; Botzat et al., 2016; Kowarik, 2011; Kransy et al., 2014; Schewenius et al., 2014; Taylor and Hochuli, 2015; Constanza et al., 1997). Urban biodiversity also provides many

other positive ecosystem services. However, the ecosystem services provided by urban biodiversity remain severely under threat due to urban expansion, habitat destruction, invasive pest species, climate change and many more. New Zealand's urban population is 86% of the total population, expected to exceed 90% by 2050 (Statistics NZ, n.d). The remaining indigenous habitat cover in nearly all of New Zealand's urban centres is below 10% (Biodiversity Collaborative Group, 2018). Therefore, cities must be considered when looking at biodiversity management in combatting biodiversity loss. Not just because of the level of loss they have faced, but for the potential that cities have in promoting positive change in large quantities. If we look at cities as target spots to better connect the population to nature, provide high quality biodiversity education and promote conservation involvement, 86% of the population can potentially become more conservation-aware.

2.3.1 Urbanisation and biodiversity loss: do the two go hand in hand?

The rate of urban population growth within the last few decades has had a direct impact on biodiversity numbers with urban land cover increasing by 10% in 16 years alone (de Oliveira et al., 2011; Environment Aotearoa, 2019). "Rapid urban expansion is impacting heavily on ecological processes and is a significant factor in both current and predicted species extinction" (Goddard et al., 2009: p. 90). In New Zealand, native land cover in urban areas sits at two per cent of the total land cover, which has significantly decreased habitat areas. The rise in urban populations has also brought an increase in predators such as cats, rats, possums and mice, which are well adapted to urban environments (Environment Aotearoa, 2019). In addition to this, urban growth facilitates an increase in non-native plant species planted in gardens that can turn into unwanted weeds (Environment Aotearoa, 2019). In order to reverse this process, there needs to be strategies in place that incorporate native ecosystems into the many facets of urban life, from local policies to everyday civic interactions with nature (Bendt et al., 2013). As stated by de Oliveria et al. (2011), the way cities are planned has a direct effect on the state of biodiversity, and urban planning practice can either hinder or help biodiversity survival. The idea of cities being appropriate places to make positive changes towards halting biodiversity loss is also supported in the New Zealand Biodiversity Collaborative Group's Report (2018: p.34) as shown below:

"The high proportion of acutely threatened environments, while highlighting the major impacts of urbanization on biodiversity loss, also indicates the potential to contribute to the protection, restoration and reconstruction of threatened environments in cities…given that

most New Zealanders now live in urban centres, the loss of indigenous biodiversity and opportunities to experience nature in day-to-day life has significant implications for people's wellbeing and connection to the natural environment."

2.3.1.1 Urban Fragmentation

Urban environments can be characterised by their fragmented nature with heterogeneous habitats and selective colonisation of plants and animals (Faeth et al., 2012). The urban fabric extends from highly urbanised and industrial areas in the centre to suburban and peri-urban spaces, with green spaces weaved throughout (Faeth et al., 2012). When cities were initially built, the relationships between green spaces were not fully understood. Ebenezer Howard's garden city model is a good example of linking green space to human benefits. The idea of green corridors and maintaining native habitats within the urban fabric has not been adequately followed, resulting in fragmentation of species' habitats. An urban layout that fragments natural spaces leads to alterations in habitats that influence behavioural changes in species, or the absence of certain species from that patch of habitat (Faeth et al., 2012).

Sadler et al. (2012) state that the spatial configuration of green spaces influence the ecological services they can provide to people. In the Waikato region (New Zealand), nature fragmentation has created patterns of dense vegetation in upland areas and little in lowland areas due to lowland being heavily urbanised or agricultural, removing biodiversity richness from some areas (Waikato Regional Council, 2016). Urban environments tend to have higher pollutant levels, and pollutant run-off from water bodies, higher temperatures and noise levels that can affect the growth and survival of organisms in the city and make it hard for them to thrive (Faeth et al., 2012). Higher species richness is found in moderate levels of urbanisation such as suburban areas that have imposed less disturbance on the natural environment due to moderate levels of development, but that does offset the native habitats associated with more condensed development (Faeth et al., 2012). For subdivisions, this may not always be the case, however, as they differ case by case.

2.3.2 The importance of facilitating biodiversity through green spaces in urban environments

2.3.2.1 Ecosystem Services

Constanza et al. (1997: p. 253) define ecosystem services as "the benefits human populations derive, either directly or indirectly from ecosystem functions". The ecosystem services provided by urban biodiversity are vital in improving the quality of life and human health and wellbeing or urban inhabitants (Goddard et al., 2009; Botzat et al., 2016). The presence of urban parks has been shown to increase the mental and physical health of urban residents, facilitate social interactions, reduce crime and increase environmental awareness and increase conservation initiatives (Ramsay et al., 2017). Asah et al. (2014) further state that people obtain several cultural benefits from involving themselves in recreational activities situated within natural environments. Human health relies upon ecosystems, which can improve mental health outcomes in urban environments (Dean et al., 2011). In recognising the vital ecosystem services that biodiversity provides for urban dwellers, there have been increased efforts to restore ecosystems in disadvantaged areas where healthcare is less accessible (Dean et al., 2011). Community involvement in disadvantaged communities leads to psychologically beneficial services such as socialising, physical activity, restoration experience, education surrounding nature and biodiversity and ethical values or nature. The next step is solidifying the preservation and enhancement of these services through urban planning decisions that place biodiversity and ecosystems central to long term plans in ensuring a healthy city (Dean et al., 2011).

2.3.2.2 Green space planning and Cultural Ecosystem Services (CES)

Researchers and policymakers have highlighted biodiversity as being an essential component of urban green infrastructure, identifying potential links and synergies between urban planning strategies and conservation goals (Botzat et al., 2016). However, urban planners are given poor strategic direction concerning urban biodiversity restoration. If urban planners were given a high quota for the amount of green cover required per new development, a significant contribution would be made to offset urban carbon emissions and decrease the urban heat-island effect. Working towards a green-cover quota may also help urban planners achieve more significant biodiversity restoration, which would feed more ecosystem services back into the urban system. Facilitating the development of more green spaces in cities also reconnects urban residents with the biosphere, which is integral to maintain sustainable green space management

in the long term (Bendt et al., 2013). To instil pro-environmental behaviours in urban residents, opportunities must be provided to value biodiversity and understand its importance. This can be done through strategic urban planning that increases nature experiences by weaving nature through main transit routes and urban hubs (Bendt et al., 2013; Soga and Gaston, 2016). This weaving of nature can be achieved through green infrastructure, where biodiversity can still be facilitated through living walls, green roofs, bird boxes and green corridors (Sadler et al., 2012). A concept called 'Cultural Ecosystem Services' (CES) also plays an essential role in addressing urban biodiversity loss. CES are directly experienced by people, making the benefits of biodiversity more appreciated and understood (Andersson et al., 2015). CES directly link to people through green architecture, nature books and paintings, nature advertising, outdoor nature recreation and natural heritage, which allow people to develop a better understanding of nature (Daniel et al., 2012). Enabling people to be a part of stewarding cultural ecosystem services may provide increased awareness of the benefits of ecosystem services (ES). Thus strategic direction for biodiversity facilitation in cities should focus on increasing people's connection to CES, especially for cultivating pro-environmental attitudes and action in urban dwellers.

2.4 Public understanding, awareness and connectedness to nature and biodiversity

Hutia te rito o te harakeke	*When the centre of the flax bush is picked*
Kei hea te Kōmako, e kō?	*Where will the bellbird sing?*
Kī mai ki ahau *He aha te mea nui o te ao?*	*You ask me* *What is the greatest thing in the world?*
Māku e kī atu	*My reply is*
he tangata, he tangata, he tangata	*It is people, it is people, it is people*

-The Biodiversity Collaborative group (2018: 53)

The above poem illustrates that people have the power to decrease biodiversity, but also have the power to save habitats with the right education and understanding of how human actions influence nature. Understanding the extent to which the public has an awareness of biodiversity (and its benefits) is a crucial foundation to exploring how the public may be motivated to engage in its management, and is education on biodiversity is sufficient. However, this is

severely under-researched (Novacek, 2008; Fischer and Young, 2007). Knowing peoples' connectedness to and understanding of biodiversity and their attitudes regarding its management are essential in the design of successful biodiversity strategies that can be implemented and supported through public action (Fischer and Young, 2007). Public participation in environmental management is vital for conservation strategies to be successful, but public understanding of biodiversity issues is limited and a barrier to their active participation (Fischer and Young, 2007). While it is understood that the public may not comprehend biodiversity issues through a scientific lens, it is crucial to note that there are many different understandings and constructs of nature and biodiversity, all of which may be personally important or collectively embedded in a culture or group. Fischer and Young (2007) found that people were able to express rich concepts of biodiversity irrespective of their scientific knowledge, ranging from knowledge of the food chain to human-nature interactions. They further found that these constructs strongly reflected the individuals' ecological values and attitudes towards biodiversity management (Fischer and Young, 2007). In New Zealand, indigenous Māori have a connectedness to nature and an understanding of biodiversity that is described as an 'equilibrium-type' knowledge. That, if one aspect of nature is lost, there is an imbalance in the whole system. This knowledge reflects the scientific understandings of nature but is grounded in te ao Māori through their deep understanding of the land (Harmsworth and Awatere, 2013). So while Māori cultural interpretations of biodiversity may not reflect those of western science, the Māori concept reflects a more 'humanised' term of biodiversity that is situated within te ao Māori and is just as 'correct'. In Switzerland, it was found the majority of the public had never heard of the terms 'biodiversity' or 'ecosystem services' and were unaware of what the two terms mean (Lindemann-Matthies and Bose, 2008). While the scientific term for 'biodiversity' may not be well recognised by the public, it is widely understood that significant natural habitats are under increasing threat (Novacek, 2008). Foley et al. (2018) found that while students at Durban University in South Africa were unfamiliar with the exact meaning and significance of biodiversity, they responded to the term positively when it was explained in layperson terms. Therefore not understanding the term does not mean they do not understand the concept of biodiversity (Foley et al., 2018).

2.4.1 Public and Scientific understandings of biodiversity loss

An eight-year study by Cullen et al. (2016) looked at 'peoples perceptions of the state of the environment' in New Zealand. They found that 31% of respondents believed water problems were the most important issue facing New Zealand, whereas only 3% identified urban sprawl

as the most pressing issue (Cullen et al., 2016). Three per cent of respondents stated that introduced pests and weeds were the most important issue facing New Zealand's environment (Cullen et al., 2016). New Zealand's native biodiversity is facing several threats that are contributing to its continuous decline. Despite this, Cullen et al. (2016) found that the majority of respondents perceived the state of biodiversity as being "good" or "adequate". This perception is surprising, given that biodiversity is continuing to decline, which has always been clearly stated in biodiversity strategies and environmental reports. The majority of respondents also thought New Zealand had a 'moderate' diversity of native land and freshwater plants and animals. Participants were also asked whether or not conservation was important, with 73% of participants saying it was 'quite important' and 5% saying 'it wasn't at all important'.

Survey participants were asked for their perceptions of how native land and freshwater plants, and animals were managed (Cullen et al., 2016). In 2000, 48% of respondents said they were 'adequately managed', but in 2016 the highest proportion of respondents (23%) believed management was 'bad' (Cullen et al., 2016). The transfer of knowledge (regarding the state of biodiversity) from the government to the public needs to be improved. Where the public has differing concepts surrounding biodiversity and its meaningfulness, there is no issue. However, when the actual state of biodiversity loss is poorly translated from the government to the public, the public is less likely to engage in pro-environmental behaviours to aid in its restoration.

2.4.2 Public awareness of biodiversity loss is poor

Since the implementation of the Convention on Biological Diversity (CBD), several studies on public awareness of biodiversity have been carried out yielding discouraging results (Navarro-Perez and Tidball, 2012). They concluded that "education, outreach and public awareness strategies are failing to elicit the interest and motivation needed for people to act in favour of biodiversity conservation" (Navarro-Perez and Tidball, 2012). Novacek (2008) argues that the level of awareness the public has on the state of the environment may not necessarily affect behaviour, and by no means results in behaviour modification towards pro-environmental behaviour. The majority of empirical knowledge on young people's perceptions, values and experiences surrounding the natural environment has focused on children and teenagers, with those aged 18 – 24 being severely under-represented (Mayo, 2012). Therefore, it is hard to predict the extent to which young adults are aware of the importance of biodiversity to humans, and in general, without more conclusive research. Hostetler et al. (2011) state that wildlife-centred education is of utmost importance for young people as they need experience with

biodiversity to foster pro-environmental attitudes later in life. However, young people are now spending less time outdoors, and for those that live in cities, biodiversity experiences may be even less available. It can be assumed that the same kind of pro-environmental behaviours can be fostered later in life with young adults, through environmental education and direct experiences with biodiversity.

2.4.3 Public conectedness to nature and the extinction of experience

People can feel connected to nature through many different avenues. Some research argues that a strong sense of place and sense of community is best at facilitating pro-environmental action and behaviour (Blake, 1999; Scannell and Gifford, 2010; Omoto and Packard, 2016). Others argue that having a strong connection to the life-supporting capacity or cultural services provided by nature is more of a motivator to influencing pro-environmental behaviour (Asah et al., 2014; Sterling et al., 2017). A sense of community is vital in developing a shared connectedness to space and sharing values of space, but this sense of shared community values towards nature tends to be lacking in urban environments.

Everyday interactions with nature are essential and facilitate pro-environmental behaviour and attitudes; however, these are decreasing in cities (Goddard et al., 2009; Soga and Gaston, 2016). This decline can be described as the phenomenon identified by Robert M Pyle, called 'extinction of experience' (Pyle, 1993). This phenomenon is described as a state of ongoing generational amnesia among city people about their relationships to, and dependence upon diverse ecosystems (Bendt et al., 2013). This extinction of experience is due to many factors, including a lack of green space in cities that mean urban inhabitants do not understand nature. Moreover, as natural environments degrade over time, each generation accepts less biodiversity as normal. Pyle (1993) argued that direct contact with nature is vital to develop one's connection with nature. Someone who grows up without direct nature interactions is also less likely to want to protect it (Wells and Lekies, 2006).

Soga and Gaston (2016) argue that extinction of experience is caused by two important things, loss of opportunity and loss of orientation. A loss of opportunity is a decline in opportunity to directly experience nature, which is often caused by urban fragmentation of natural systems. It is argued that because neighbourhood environments are the sites that are encountered by individuals daily, emphasis on increasing the opportunity for direct nature experiences in immediate neighbourhoods is vital. A loss of orientation is where one has a reduced positive

orientation towards engaging with nature through a loss of emotional affinity with it. Those who have a stronger positive orientation towards nature are more motivated to experience it directly. A loss of interaction with nature also contributes to one's attitudes and beliefs about nature, perceived norms of environmental ethics and willingness to engage in its protection (Soga and Gaston, 2016). The relationship between experience with nature, nature connectedness, attitudes and beliefs and engagement in pro-environmental behaviours is complicated and can be influenced by several variables.

2.4.4. Young adults and their understanding of biodiversity

Some researchers have looked into university student's understandings of biodiversity and its management. While this research will be focusing on young adults in urban New Zealand, other studies have looked at young adults in Canada, South Africa, the UK and Cyprus, to name a few. The young adults' information from these studies will inform strategies that aim to improve the state of biodiversity. Both Foley et al. (2018) and Arbuthnott and Devoe (2013) describe the university population of young adults as being most likely to be the future leaders, developing and influencing these strategies and therefore an important group to understand. Spash and Hanley (1995) conducted a survey with 125 university students in Stirling, the UK in 1995, two years after the Convention on Biodiversity came into effect, and found that only 44% to 50% of participants understood the terms biodiversity and genetic biodiversity. Thirty-seven per cent in total had no idea at all what biodiversity was, but most agreed that environmental problems were severe, and change was needed to protect biodiversity (Spash and Hanley, 1995).

In more recent studies such as that by Arbuthnott and Devoe (2013), student participants in Canada were asked whether biodiversity has value, and to elaborate on their answer. While 84% said it was valuable, most were unable to state the reasons why they believed this to be true (Arbuthnott and Devoe, 2013). Most frequently, biodiversity was identified to be meaningful in terms of its pleasurable attributes and aesthetics. Only one of the 76 participants mentioned that biodiversity was valuable for the ecological services it provides (Arbuthnott and Devoe, 2013). Within their study, around 23% of students were able to describe threats to biodiversity but were unaware of why biodiversity was at risk. Twenty-six per cent mentioned that human impacts had been the source of most biodiversity loss but were still generally unaware of how this happened. Arbuthnott and Devoe (2013) also found that those who had taken a biology course had a more comprehensive understanding of terms, positive associations

with biodiversity and more confidence in their biodiversity knowledge. One of the problematic findings that came from Arbuthnott and Devoe's (2013) research was that participants tended to understand biodiversity in terms of discrete species (for example looking at individual species) and lacked mention of the interdependence and interactions between biodiversity systems. Why this may be problematic is that attitudes and understandings tend to inform action and beliefs. Therefore, action targeting individual species may gain more significant support than habitat or ecosystem protection initiatives. In the case of Dunedin, New Zealand this could be an example of supporting planting initiatives towards enhancing the habitat of green gecko over planting initiatives to increase coastal habitats for a plethora of marine bird, marine animal and plant life. The latter would be more effective in terms of ecological community-based environmental initiatives. Viewing species as independent from each other and independent from habitats also results in misunderstandings regarding the threats of agriculture, forestry, genetic modification and urbanisation on biodiversity (Arbuthnott and Devoe, 2013).

Nisiforou and Charalambides (2012) also looked into tertiary students' knowledge and attitudes towards biodiversity (in Cyprus) with the addition of associated behaviour towards biodiversity. Schmidt's (2007) study found a correlation between positive attitudes and behaviours towards the environment between those students who had taken environmental courses, similar to the results of Arbuthnott and Devoe (2013). Nisiforou and Charalambides (2012) specifically looked at biodiversity attitudes of first and second-year university students and measured their responses against their parents' professions and the kind of place/environment they spent their childhood. Only 16% of students rated their knowledge on biodiversity as being 'a lot' with most students stating they knew a fair amount. When asked about the extent to which they understood international conventions, most did not know much about the Convention on Biological Diversity with 25% stating they had never heard of it (Nisiforou and Charalambides, 2012). Approximately 70% of students had a positive attitude about protecting Cyprus' biodiversity, with 10% stating they believed there was absolutely nothing they could do to save global biodiversity. A significant result in Nisiforou and Charalambides' (2012) research was that even though many had a positive attitude towards biodiversity, they were not committed to taking actions to improve the environment by changing their behaviour. The same was found in students' reluctance to encourage wildlife in their gardens, intervening in someone littering and their recycling habits. Their reluctance to do these things came down to being innapropriately informed, culture, society and personal financial situations. The variables of students' parents' occupations and the place where they

grew up did not correlate with their biodiversity beliefs and action (Nisiforou and Charalambides, 2012). Understanding young adults' values towards biodiversity strategies to protect and enhance biodiversity has been stated as an area of future studies (Arbuthnott and Devoe, 2013). However, understanding young adults' engagement in nature management is still very under-researched.

2.5 Public engagement in biodiversity management and participation trends

Fischer and Young (2007) state that public participation in environmental management is essential for the success of conservation initiatives. In support of this, the Biodiversity Collaborative (2018: p.41) state "…improved biodiversity outcomes will not be achieved without the critical link of empowering people". It is more evident now than ever that the commitment of local communities is needed for successful biodiversity conservation (Vodouhê et al., 2010). In the last century, nature conservation has been in the hands of the central government through the creation of sanctuaries and national reserves. Now, governments and local councils are starting to adopt more measures that focus on enhancing avenues for public participation in environmental management (Vodouhê et al., 2010; Novacek, 2008). Couvet et al. (2013) claim that the current environmental predicament of our declining biodiversity is a result of ignorance and institutional failure as well as a lack of meaningful environmental reporting avenues facilitated by citizens or decision-makers. To fully explore the literature surrounding public engagement trends in biodiversity or environmental management, this section is divided into multiple sub-sections.

2.5.1 The benefits of public engagement in biodiversity management

Kadambi and Choi (2010: p.288) state "the guiding principles of equity, sustainability, and civic engagement are needed to offset any institutional failure in order to fulfil the balance of human needs and co-existence with our planet". Given the value of biodiversity to people, it makes sense to communicate the value of biodiversity to all citizens so that they too can play a role in its protection and use (Foley et al., 2018). Involving the community in conservation efforts can also be a successful approach in other aspects, such as its ability to accommodate people's needs (Vodouhê et al., 2010). Buta et al. (2014) state that recent studies had shown successful park management as being dependent on collaboration with local communities. Public collaboration in biodiversity management initiatives is only now starting to be central

to successful management models, yet there is still little research looking at the efficiency of community efforts in planning (Sterling et al., 2017). Collaboration also works in increasing public awareness of biodiversity loss which can lead to long term more responsible use of natural spaces by the public, as expressed in previous sections (Buta et al., 2014). In support of this approach, Kadambi and Choi (2010) suggest that public engagement is essential in the sustainable long-term management of urban spaces as it holds the public accountable for their actions.

2.5.2 Engaging in pro-environmental behaviour / initiatives

In New Zealand, there are currently many positive civic actions taking place aimed at restoring indigenous ecosystems (The Biodiversity Collaborative Group, 2018). Cullen et al. (2016) found that people who had tertiary education were more likely to participate in environmental initiatives. In terms of what people were doing, 95% of participants recycled, 80% actively reduced their electricity, and 82% tried to buy environmentally friendly products (Cullen et al., 2016). Only 15% of respondents had participated in a hearings/consent process on the environment, and 25% had been part of an environmental group (Cullen et al., 2016). While this study was great at highlighting New Zealander's perceptions and actions towards environmental action, age was not a factor that was deeply explored, despite ethnicity, region and level of education being factors.

Buta et al. (2014) and Kollmuss and Agyeman (2002) discuss socio-phycological theories and models that are used in assessing pro-environmental behaviour by citizens. Some of them include the theory of planned behaviour (1991) and the theory of interpersonal behaviour (1977) which acknowledge that there is a direct relationship between 'attitude towards a behaviour' and 'intention to perform the behaviour'. Early models of pro-environmental behaviour, from the 1970s, were based on the linear understanding that increased knowledge on environmental degradation led to environmental awareness (or concern) and then pro-environmental behaviours. These models assume that increasing environmental education would directly result in increased pro-environmental behaviour by the public; see the model below (Figure 3). Since then, these models have been proven to be wrong.

Figure 3: Pro-environmental behviour linear model (adapted from Kollmuss and Agyeman, 2002: 241).

While increasing the publics' understanding of the environment is beneficial to enlighten the public on environmental issues, there is no evidence that it is linked to increasing pro-environmental behaviours. Despite this, many non-government organisations and local councils use education as a tool to encourage pro-environmental behaviour, whereas this might not be the best approach to increase public activation. Rajecki (1982) states that direct experience, normative influences and temporal discrepancy are proven to help increase the pro-environmental behaviour of a population.

Individuals are more likely to engage in pro-environmental behaviour if they have had direct experience with the environmental issue at hand, rather than an indirect experience. If an individual has a direct connection to an issue such as biodiversity loss, it may be in the form of no longer hearing bird song near their home. To increase the direct connections people have to biodiversity in urban environments, it would require green infrastructure and innovative urban design that facilitates biodiversity (Kollmuss and Agyeman, 2002). Secondly, social norms can influence peoples' attitudes towards the environment. For example, in New Zealand, single-use plastic bags are now banned in supermarkets, and most stores apply a surcharge if a plastic bag is required. This is changing the dominant culture from one that is unsustainable (in plastic bag use) to more sustainably conscious, which lessens the gap between attitude and behaviour (Kollmuss and Agyeman, 2002). Lastly, 'temporal discrepancy' in this context is the idea that people's attitudes change over time. For example, if a bill to increase the forestry industry was introduced in New Zealand in the 1940s, it would likely go ahead, whereas now it is far less likely because of the attitudinal change of the population. These can all be used to increase pro-environmental behaviour by a population, with education as a supplementary strategy.

Ajzen and Fishbein's (1980) theory of planned behaviour and theory of reasoned action are applied when trying to understand the attitude – action discrepancies (Figure 4). The theory of planned behaviour has been described as the most influential in attitude behaviour modelling (Green et al., 2019). For example, an individual's intention to be involved in biodiversity

management depends on the individual's attitude (either positive or negative) towards biodiversity, whether they can afford to be involved in biodiversity management as well as social norms, such as whether other people in the neighbourhood are involved in it. Using theories to identify high correlations between pro-environmental attitude and pro-environmental behaviour, the researcher must specifically target the attitude of a specific behaviour. Kollmuss and Agyeman (2002) use climate change attitudes and driving behaviour as an example of low correlation, with the level of concern for climate change showing no change in driving behaviour, because climate change is not directly related to driving. In the case of biodiversity loss, while the research may find some young adults to be more unsettled about the rate of biodiversity loss, this does not directly correlate to them being more likely to engage in pro-biodiversity behaviours, such as planting or being a part of a group. "The ultimate determinants of any behaviour are the behavioural beliefs concerning its consequences and normative beliefs concerning the prescriptions of others" (Ajzen and Fishbein, 1980: p. 239).

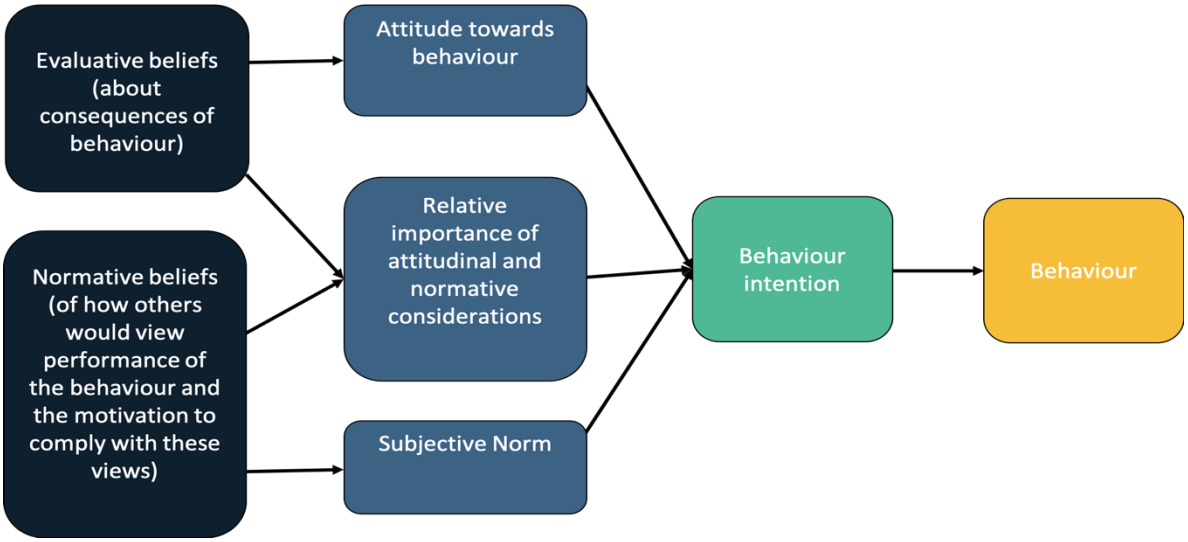

Figure 4: Theory of reasoned action (adapted from Ajzen and Fishbein, 1980).

The 'model of responsible environmental behaviour' by Hines et al. (1987), found that individuals are more likely to engage in environmental action if they are familiar with the environmental problem, know how to act to lower their impact on the problem, have assessed whether or not they can bring about change by their action, have a strong environmental attitude and verbal commitment, and a greater sense of responsibility over the issue. In regard to pro-social behaviour, Borden and Francis (1978) theorise that those who are more selfish and competitive are less likely to act ecologically, whereas those who have satisfied their personal needs will act more ecologically as they will theoretically have more resources (money, energy,

time) to care about large scale issues. For those that do not have a strong environmental concern, Blake (1999) states that individual, social and institutional barriers are a deterrent to practicing pro-environmental behaviours. Individual barriers include feeling that their contribution is not helping and having a lack of trust in institutions (such as the council or the government). Social and institutional constraints/barriers include lack of time, lack of money and a lack of information. All in all, many factors may influence one's engagement levels in pro-environmental behaviour, including age, gender, institutions, economic factors, social and cultural norms, motivation, knowledge, values, attitudes, awareness, emotions, 'locus of control', responsibility and priorities (Blake, 1999; Borden and Francis, 1978; Hines et al., 1987; Kollmuss and Agyeman, 2002; Ajzen and Fishbein, 1980).

The public can engage in environmental management through many different avenues such as government agencies, businesses and other stakeholders, but are more willing to do so if goals are corresponding (Kadambi and Choi, 2010). One of the shared goals between the public and the government is that of the biological system which incorporates keeping natural capital healthy and steady (Kadambi and Choi, 2010). It is hard to find the right tools to cultivate the right relationship between civilians and government in environmental management, as society is diverse and desires different types of engagement. In the research by Seymour and Hacklay (2017), environmental volunteers were grouped into one-session, short term and long-term categories to track the patterns of environmental engagement across a few cities in the UK. In their study they found that of those who engaged in environmental initiatives, the one-session volunteers made up the largest group. One-session meant a one-off volunteer day, but no participation in any environmental group that met frequently. Seymour and Hacklay (2017) have expressed the need for more research to be conducted looking at volunteers' engagement patterns, including underlying motivations to engage. Regarding active pro-environmental behaviour by young adults, Nisiforou and Charalambides (2012) found that 50% of second-year students said they did not do anything to encourage wildlife in their gardens. Nisiforou and Charalambides (2012) argue that they were not encouraging wildlife in their gardens due to several factors, such as lack of information, culture, society and personal financial situations. As stated by Kadambi and Choi (2010), there should be mechanisms in place to help facilitate public involvement in environmental initiatives.

2.5.3 Motivators for engaging in biodiversity management initiatives

Sterling et al. (2017) claim that the effectiveness of environmental management projects can be enhanced by identifying significant predictors or motivations for participation and capitalising on these. Thus, it is essential to understand how the public is motivated to engage prior to any intervention, to then use this information to help increase engagement numbers. Research looking into public motivations for engaging in environmental initiatives is aplenty, ranging from how to better encourage engagement through regulatory focus theory (Nisbett and Strzelecka, 2017), human-nature attachment (Buta et al., 2014), stakeholder compensation, and social benefits (Sterling et al., 2017). Public motivations to engage in biodiversity management initiatives must be understood and explored to grasp where current public engagement efforts are falling short (van den Born et al., 2018).

2.5.3.1 Regulatory focus theory: Why participate?

Van den Born et al. (2018) argue that motivations towards pro-environmental behaviour are difficult to map, as people often act to safeguard ecosystem services for a complex combination of reasons. Regulatory focus theory is a theoretical model which can be used to assess an individual's state of mind and link it to the types of environmental behaviour they engage in (Nisbett and Strzelecka, 2017). Nisbett and Strzelecka (2017) further elaborate on this theory, stating that when using persuasive messages to encourage people to engage in environmental action, the state of mind of the participant is essential to understand. The state of mind can either be prevention-focused or promotion-focused. Prevention-focused individuals prefer to think about goals in a loss or non-loss mindset. Thus when considering whether or not to engage in environmental behaviour, the person will consider whether or not the experience will result in a loss for them or not. Those in a promotion-focused mindset will consider engaging in environmental activities through a 'gain or non-gain' mindset, considering whether or not they can personally gain anything out of the experience or not at all (Nisbett and Strzelecka, 2017). By looking at these two mindsets, either being loss or gain, we can start to apply it to how individuals may be motivated to engage in environmental management. If a young adult with a loss or non-loss mindset considered whether or not to take part in an environmental initiative, they might consider travel cost and distance, time taken and money spent. Thus, motivators for engaging could be things like free transport, lunch provided, no cost and little time commitment. Those with a 'gain' mindset may consider engaging if there were motivators such as a useful reference, experience, meeting new friends and being part of a new group.

2.5.3.2 Place attatchment and willingness to engage

Having a strong place attachment to an area can also be a motivator to engage in public environmental management initiatives (Buta et al., 2014; Asah et al., 2014; van den Born et al., 2018). Several researchers acknowledge that there is a relationship between having a strong place attachment to an area, and relative environmental concern and pro-environmental behaviour (Buta et al., 2014; Halpenny, 2010; Ramkisson et al., 2012). However, it has been identified that more exploration into the different contexts of place attachment and environmental behaviour is needed (Buta et al., 2014). Young adults between the age of 18-25 years who may be residing in a new city while completing tertiary education are likely to have little place attatchment. It would be interesting to see if place attachment can manifest and contribute to pro-environmental tendencies towards biodiverse areas for young adults in a new environment.

At a community level, place attachment is one of the key motivators for fostering collective community action towards sustainable resource management and restoration projects (Buta et al., 2014). These place attachments shared by members of a community may also lead to a stronger sense of community, which also plays a significant role in motivating people to engage in conservation management (Asah et al., 2014). Cullen et al. (2016) asked survey participants their reasons for belonging to an environmental group, with 76% stating that it was 'to protect and enhance the local environment' and 66% saying 'to look after their local area'. Place attachment was also seen as a critical motivator for biodiversity management in those who are not usually involved in biodiversity services (van den Born et al., 2018). In addition to place attachment, the aesthetic results of having rich biodiversity were also motivational. In a study by van den Born et al. (2018), motivations to engage in biodiversity initiatives were compared between biodiversity activists and people from other environmental action groups. Those who were biodiversity activists were motivated to engage by curiosity and learning, valuing nature, living a worthwhile life and safeguarding nature for future generations. For those who were involved in environmental initiatives without a biodiversity focus, they were more motivated by safeguarding the aesthetic value of biodiversity, such as its "beauty". Thus for those who were less-committed to biodiversity management initiatives, the beauty value of nature was essential to emphasise.

2.5.3.4 Economic motivators

For some members of the public, economic incentives are enough to motivate pro-environmental behaviours and involvement in environmental management initiatives, especially for those that may not have a pro-environmental predisposition, lack environmental connectedness, or do not care about the state of the natural environment. Economic incentives can also be an excellent tool for engaging more impoverished communities, such as paying a community for enhancing ecosystem services in an area as compensation for the increased benefit on the entire community (Buta et al., 2014). To incentivise biodiversity management, governments tend to provide a monetary valuation of ecosystem services (van den Born et al., 2018). However, this has been proven as insufficient to motivate people. Instead, non-monetary values are argued to be better motivators (van den Born et al., 2018).

2.5.3.5 Social Motivators

Lastly, social factors can be another motivator to engage in pro-environmental behaviour and action. Sterling et al. (2017) found that social benefits to conservation initiatives were more of a motivating factor to engage in volunteering than the state of the environment. Asah et al. (2014) found that managers of environmental initiatives believed volunteers were participating out of a desire to assist in forest management to provide a healthier forest ecosystem. However, the study found volunteers to be engaging due to the number of benefits ranging from the feeling of giving back to nature, fulfilling a sense of duty, and opportunities to be closer to nature (Asah et al., 2014). Social factors can range from the ability to make new friends, conserve for future generations, being amongst nature for personal gratification and wellbeing or enhancing an ecological area for the community (Sterling et al., 2017). Spending time with friends and meeting people with similar interests were found to be important to volunteers. Peer-pressure from friends and social norms towards environmental attitudes also contribute to motivating people to engage in pro-environmental behaviours (Sterling et al., 2017). The idea of social motivators may be an essential part of understanding young adults' motivators for engaging. A survey by Hobbs (2012) found that participants in wildlife monitoring in the United Kingdom said they experienced benefits such as learning about the environment, personal enjoyment from the projects and feeling a sense of self-purpose (Sterling et al., 2017).

2.5.4 Why it is important to engage young adults

Foley et al. (2018) argue that young adults who are university students are the future leaders of biodiversity management. Arbuthnott and Devoe (2013) state that current young adults will experience more pressure than previous generations to address the state of biodiversity and rapid biodiversity loss. Therefore, exploring what young adults understand about biodiversity is central to supporting biodiversity strategies in the future (Arbuthnott and Devoe, 2013). It is then vital to look at how young adults understand and connect to biodiversity and to what extent they engage or do not engage in management initiatives. This thesis research centres on young adults in New Zealand between the ages of 18-25 years, who may show similar or different understandings of nature to those in other university-based biodiversity studies such as those of Arbuthnott and Devoe (2013), Foley et al. (2018) Huang and Lin (2014) and Nisiforou and Charalambides (2012). So why is it essential to engage young adults in biodiversity management and learning now? Young adults, especially those who are students at university, tend to live in urban environments. In cities, they are at higher risk of exposure to the "extinction of experience" with nature, experiences that are so vital in building a strong connectedness to nature (Sterling et al., 2017). Peters et al. (2015) found that the highest proportion of volunteers in environmental community groups were aged between 51 and 65 years. Young adults between the age of 19-30 years constituted only 4.7% of groups in New Zealand. What this figure shows is that young adults' participation in environmental groups is particularly low, and needs to be explored. Huang and Lin (2014) found that of American university students, those who had experience in conservation activities were more concerned about environmental issues and more confident that people could help.

2.6 Engaging the public: the barriers

2.6.1 Public understanding of nature issues

The Biodiversity Collaborative Group (2018) stated that they were fully aware of the number of barriers to expanding the initiatives of enhancing and restoring indigenous ecological habitats in New Zealand. One of the main barriers to active public participation in biodiversity management is the diverse public understanding of biodiversity issues. The majority of biodiversity issues are communicated to the public through scientific terminology and fail to account for the many differing constructs individuals may have on nature and biodiversity

management. Regarding biodiversity specifically, Foley et al. (2018) and Novacek (2008) both highlight a lack of understanding and mis-information surrounding biodiversity as being one of the main contributors to lack of active engagement by the public. Lindemann-Matthies and Bose (2008) found that 60% of Swiss high school students had never heard of the term biodiversity. Hunter and Brehm's (2003) research in the United States found participants demonstrated little awareness or understanding of biodiversity and believed biodiversity loss was only occurring in countries outside of the United States.

Novacek (2008) argues that the term 'biodiversity' requires repeated explanations in order for the public to truly understand its meaning, and without any understanding of what biodiversity means, they are unable to understand the ecosystem services that come with biodiversity, or that biodiversity loss has a direct effect on human wellbeing. Foley et al. (2018) mention that there is a "communication disconnect" between ecological scientists and the public. Where there is a lack of clear communication surrounding biodiversity loss or the benefits of biodiversity, the public may interpret information in a way that reinforce their predispositions (Foley et al., 2018). For example, Novacek (2008) declares that people are under the assumption that the state biodiversity is in does not affect human wellbeing, and this could have been caused by a communication disconnect between scientists and the public, an idea that Foley et al. (2018) also discusses as problematic. The state of biodiversity in a country like New Zealand is often talked about regarding general biodiversity declines or a specific species. However, the effects of biodiversity loss on human-beings is not discussed as often, meaning that for a lot of people the connection between people and biodiversity is not made at all. This can exclude those who are more anthropogenically focused on engaging in biodiversity management initiatives, all because of a communication gap that could have mobilised a particular group. An education gap between people and strategies can be a significant deterrent to the public engaging in management.

2.6.2 Navigating relationships between public and management

Another challenge to engaging the public is the lack of understanding between participants (in environmental initiatives) and the groups managing them, ranging from NGOs to local government departments (Sterling et al., 2017; Vandzinskaite et al., 2010; Seymour and Haklay, 2017). Sterling et al. (2017, p.163) claim that "frequently, outsiders [of community environmental groups such as local government] try to engage with communities without efficiently understanding how and with whom they interact, manage resources or make

decisions". Those wanting to engage in an environmental initiative might reject an opportunity if they were left out of organising the objectives of the initiative. An example of this may be where central government departments dictate a management action plan for a community, without collaborating with the community in writing the plan. This top-down management approach can lead to a phenomenon called "engagement fatigue", which can be experienced by a community group if they are continually asked to engage in a project that is not catered to their desired management approach (Sterling et al., 2017). Sterling et al. (2017) mention other barriers to achieve collaborative environmental initiatives between government and communities as inadequate funds, language barriers and power inequities. Poor trust between stakeholders or a lack of faith in the government's environmental agendas has also been proven to be a barrier to public engagement in initiatives (van den Born et al., 2018). Vandzinskaite et al. (2010) claim that three things inhibit environmental participation; (1) a low interest in nature as being a common good, (2) a negative public attitude toward non-material values and; (3) a lack of management and leadership within environmental groups. Hewlett and Edwards (2013) support this by stating that national park management can strongly influence people's perceptions about biodiversity conservation and their willingness to act. Therefore national park managers (in New Zealand's case; this is the Department of Conservation) must understand communities to involve them.

2.6.3 Transport, Distance and Cost

Transport and distance have been identified as two significant barriers to public engagement with the natural environment (Ramsay et al., 2017). Ramsay et al. (2017) refer to this as "distance decay" which means that as the distance to a destination increases the likelihood of visitation decreases. Ramsay et al. (2017) looked at barriers to millennials visiting Urban Rouge National Park in Toronto, Canada, and found distance, transport and awareness as being the three main barriers to visiting. The cost was also another let down. If the regulatory focus theory is applied in this context, for someone who has a loss / non-loss mindset and is not environmentally inclined, having to pay to join an environmental initiative will deter them from engaging. As Nisbett and Strzelecka (2017) state, it is harder to incentivise engagement to young adults if they are asked to pay to participate. Thus, concerning millennials and their access to biodiverse spaces, the distance to a space or the potential cost inhibits their ability or motivation to engage. A New Zealand-wide study found that people's reasons for not belonging to an environmental organisation were that they could not commit the time (49%) and were not physically fit enough or able (29%). Only 7% said that it was because they were not interested

in nature (Cullen et al., 2016). Another significant reason for people not being involved included not knowing how to become involved (12%). Thus some of the direct barriers to people's involvement are time, ability, awareness on ways to get involved and cost.

2.7 Policy to practice: New Zealand's biodiversity policies

Chapter 1.3 introduced the key legislation and strategies guiding biodiversity management in New Zealand. Since the establishment of the Convention on Biological Diversity in 1993, biodiversity conservation has emerged as a field of international policies (Kowarik, 2011). Currently, New Zealand's policies and strategies on safeguarding biodiversity and the management of the natural environment such as the Conservation Act and Biodiversity Strategy are considered inconsistent and flawed through translations across different sectors of society and government (The Biodiversity Collaborative Group, 2018). As stated by Gill et al. (2009) it is common for management frameworks for ecologically significant areas to be produced in such a way that separates green spaces from their context and characterises people as a significant disturbance. New Zealand's strategies on biodiversity management tend to focus on conservation estates or identify ecologically significant spaces without their surrounding context. This makes it challenging to apply the goals and action plans towards on-the-ground action in urban environments as there is too much of a disconnect between built and natural space. Biodiversity is continuing to decline, and policies to safeguard and restore biodiversity face an implementation gap. The interconnectedness of the two should be celebrated and observed in order to build on ways in which meaningful urban environmental management can be facilitated. In support of this, Gill et al. (2009) state that this kind of separation between the role of green spaces within residents' lives may compromise conservation goals.

When looking at local strategies to create more biodiversity in cities, the biodiversity-people interface is vital to understand. However, patterns of engagement and civic values of biodiversity are under-valued when developing local biodiversity strategies and urban design guides towards greening (Botzat et al., 2016). We have seen in New Zealand a dialogue issue between the actual state of the environment and the perceived state of the environment, which is indicative of potential problems (Cullen et al., 2016). The move from focusing on conservation primarily in wilderness conservation estates to looking at strategies that address biodiversity loss in urban environments has been slow and are still not entirely adequate. As stated by Hostetler et al. (2011) in a time of increasing urbanisation the urban biodiversity

conservation vs wilderness conservation remains controversial, especially concerning the distribution of the national conservation budget. That is why public participation and the creation of community environmental groups in urban areas is vital to urban biodiversity management. Despite its importance, government agencies would commonly overlook community environmental groups and their contribution to ecosystem services and infrastructure. However, now there is a growing awareness of the effectiveness of collaboration, community participation and civic led initiatives (Kransy et al., 2014). This thinking has been slowly adopted by the New Zealand government, with the Biodiversity Collaborative Group (2018) mentioning that there will be an essential new policy supporting existing efforts rather than cutting across them. City councils are still required to work towards implementing international environmental agreements, but through the trickle channels from central government. Although local governments are not signing international agreements, they hold the most responsibility in implementing direct on-the-ground measures at the city level (de Oliveira et al., 2011).

2.8 So how may planners facilitate successful public participation in biodiversity management?

Some of the barriers to public engagement in environmental iniatives identified throughout the literature included education gaps, lack of understanding of community groups by conservation and government agencies, transport, money, ill-information and lack of environmental regard/connectedness.

2.8.1 Increasing understanding between conservation and government agencies, and the public

Any successful strategy for engagement "starts with the knowledge of who is being engaged and what they already know and do not know" (Novacek, 2008: p. 11572). It is also essential to address stakeholder values, acknowledge inter and intro-group variations and respect existing environmental groups and institutions developed by the public (Sterling et al., 2017). Cullen et al. (2016: p.52) mention that "where public perceptions of nature run ahead of policy, the failure for policymakers to pick up on those issues will undermine confidence in environmental management and policy-making". Current efforts to motivate people are falling short and action statements underneath objectives have not accounted for public motivators (van den Born et al., 2018). Currently, biodiversity management policies and legislation emphasise the ecosystem services or "life-supporting capacity" such as written in the Resource

Management Act (1991). Section 2.5.3 discussed motivations to engage; it is apparent that there is a range of different motivators that encourage the public to be involved in environmental management initiatives. For conservation agencies, planning bodies and local councils, it is important to consider these motivations when organising or collaborating on initiatives. Asah (2012) found that helping volunteers to reflect on the reasons why they are volunteering and then continually referring to those throughout a project positively increased recruitment and retention of people's involvement over time.

Furthermore, Asah et al. (2014) found that managers of environmental initiatives should tap into people's motivations and think outside of just the environmental benefit of an activity. Instead, the social and cultural benefits of an environmental activity should be clearly articulated. By using this method of developing environmental initiatives that match both the motivations of participants and their desired engagement level, Seymour and Haklay (2017) argue that this will increase long-term contribution rather than one-off participation. For those who are not environmentalists, strategies must incorporate other values like "the beauty of biodiversity" to motivate those who do not tend to participate in biodiversity management (van den Born et al., 2018).

2.8.2 Increasing environmental learning avenues

"Education provides a key role in developing environmental awareness and sustainable behaviour in future generations" (Nisiforou and Charalambides, 2012: p.1029). Novacek (2008) argues that education is one of several key drivers influencing attitudes towards pro-environmental behaviour. The earlier an individual is educated on the environment, the better for increasing their support for biodiversity initiatives. For young adults who are post-education, informal education is essential in facilitating a connection to nature, primarily as most of this age group reside in cities (Novacek, 2008). Adults who grew up in and currently reside in cities may have no other connection to native habitats than urban parks. Therefore education is a vital component for increasing awareness and action in urban spaces.

2.9 Conclusion

The New Zealand government is now moving towards participation models that highlight the importance of effective collaboration between authorities and the public (The Biodiversity Collaborative, 2018). A plethora of research on public values, perceptions, attitudes and

understandings of biodiversity has shown that the public has diverse meanings and ideas of biodiversity. They also have little understanding of its scientific meaning or the benefits biodiversity has for humans through ecosystem services (Fischer and Young, 2007; Novacek, 2008). Government policy tends to take a scientific approach to address environmental issues that do not co-align with the public understanding of biodiversity, which hinders the policy – action efforts. In urban environments, this is exacerbated through the extinction of experience towards nature. Thus, environmental strategies should seek to emphasise the cultural ecosystem services that biodiversity cultivates for people, to increase public engagement in biodiversity initiatives.

Society is heterogenious, with both differences and similarities with patterns and trends of engagement and values within the public. The majority of research on nature values has focused on society in general, or children, teens and older adults. For young adults, research has explored the understandings of biodiversity held by tertiary students. The findings were mostly patterns of young adults understanding that biodiversity is essential, but not knowing exactly why (Foley et al., 2018). It was also found they had high environmental awareness, but that this did not translate to pro-environmental behaviour. (Nisiforou and Charalambides, 2012).

This literature review found that exploring people's values of biodiversity and subsequent behaviour is multi-faceted. Research that explored motivations to public engagement provided insights into why some people may not be engaging in biodiversity initiatives. The barriers to public engagement in environmental initiatives included lack of education, awareness, time and understanding. Other barriers found in the literature were a lack of faith in an individual's contribution to the bigger picture, and distrust in environmental initiatives. Environmental and biodiversity policies are not addressing these barriers. Neither are they reflecting societies' diverse nature values and motivations to participate in biodiversity management.

All in all, research on motivations and barriers to public engagement in biodiversity management provided insight into how understanding a group's level of awareness, values and education levels towards biodiversity may help find patterns between young adults and their willingness to engage, motivations for engaging and reasons for not engaging. In addition, the literature revealed ways in which biodiversity policy (both local and national) and environmental groups (NGOs and community groups) may be able to cater their objectives and

initiatives towards public values better, especially with respect to increasing participation and retention of participation over time in urban biodiversity management projects.

It is evident that there is a gap in the literature on young adult's current engagement patterns and their barriers and motivations to engaging in biodiversity initiatives. There is limited research on their perceptions, education levels on biodiversity and values of nature and the factors that shape their behavioural patterns. This research seeks to fill this gap within a New Zealand context and provide insight into young adults and biodiversity that authorities may use to re-configure management strategies.

3. Methodology

This chapter explains the conceptual methodological approach to the research and justifies the methods used. Ethical and positionality considerations are also discussed.

3.1 Introduction

This chapter discusses the methodology used to address the aims and objectives of this research. The research sits within a wider body of research that looks at people and nature relationships, environmental and conservation psychology and public participation in environmental planning. The discipline of environmental psychology developed in the United States in the 1960s to explore the complex interactions between humans and the environment (Kollmuss and Agyeman, 2002). A number of psychological models were found in existing research to explain the concepts of human-nature interactions, which have developed and evolved overtime from linear 'education informs action' paradigms, to a complex combination of 'education, nature experience, barrier, motivation' models (Ajzen and Fishbein, 1980; Buta et al., 2014; Hines et al., 1986; Kollmuss and Agyeman, 2002).

First the aim and the research questions will be revisited, then an overview of the conceptual approach, research design, methods, limitations and research positionality will be discussed. The reasoning behind the use of mixed methods (qualitative and quantitative) will also be justified. Ethics B approval was obtained by the University of Otago, in order to conduct the research through an online survey and interviews with key informants.

3.2 Aim and Research Questions Revisited

As stated in Chapter 1, the aim of this research is as follows:

"to explore young adults' levels of understanding of biodiversity in New Zealand and their patterns of engagement in biodiversity management initiatives, including barriers and opportunities to their engagement"

This aim has been created to guide the research to explore how young adults' current engagement levels and trends in urban biodiversity management can help understand the gaps in planning action on the ground. Young adults are an under-researched group in society in terms of their action within planning systems, but also regarding their values and understanding of biodiversity. However, they make up a large group in urban populations, especially in cities that contain tertiary education institutions. While conservation of urban biodiversity has often been regarded as not as important as conservation in wildlife estates, there is increasing recognition of the value of urban biodiversity and ecosystem services. Therefore, this group must be able to engage in conserving biodiversity within urban environments in which they live. Three research questions have been formulated to address the aim:

- **Research Question One:** To what extent are young adults aware of urban biodiversity?
- **Research Question Two:** What are young adults understanding and awareness of the biodiversity planning process and strategies to enhance biodiversity?
- **Research Question Three:** In what ways and to what extent are young adults currently engaging with urban biodiversity, what are the barriers and the opportunities to better engaging them?

3.3 Conceptual Approach

This section discusses the theoretical foundations for the selected methodology used in this research. Both constructivist and positivist approaches to gathering data were employed through mixed-methods. A mixed-methods pragmatic approach using both qualitative and quantitative approaches was adopted due to the nature of the research requiring experiences, beliefs and understandings of individuals as well as perceptions, but also the need for quantifying those perceptions into percentages of the sample population. As meeting the aim of this research requires a collection of experiences and understandings, a positivist approach was vital in ensuring data collection was unbiased, while using a constructivist approach allowed for objective and holistic data methods (Kitchin and Tate, 2000).

3.3.1 Constructivist-positivist research approach

In order to understand the qualitative knowledge that has come from constructed knowledge held by young adults, a constructivist-positive approach was adopted. This approach asserts that knowledge is subjective and constructed by individuals whose meanings are created based on their values and experiences (Bryman, 2016). The constructivist-positivist approach is useful as the perceptions young adults have towards nature may vary depending on their educational background, place of upbringing, interest in nature and familiarity with nature. To further explore this, a qualitative approach was used to explore participants' relationships with nature, and their background knowledge as well as their awareness of nature in their daily life.

3.4 Research Design

This thesis will provide an understanding of young adults that can be used to inform planners when developing environmental action policies and strategies in a way that can be easily accessed and applied by this group in society. Too often, the same groups of people engage in environmental action. In order to increase the effectiveness of biodiversity enhancement in urban environments, all groups need to be considered as potential conservation participants. Qualitative data will be gathered as they allow human understanding, perceptions and experiences to be explained within conceptual frameworks and paradigms (Hay, 2010). Quantitative data are also employed in this research, as the primary method is a questionnaire survey that allows responses to be analysed quantitatively. A policy and plan review was

conducted to inform Research Question Two, and all other methods were used for all research questions. Figure 5 shows how they are used in this research.

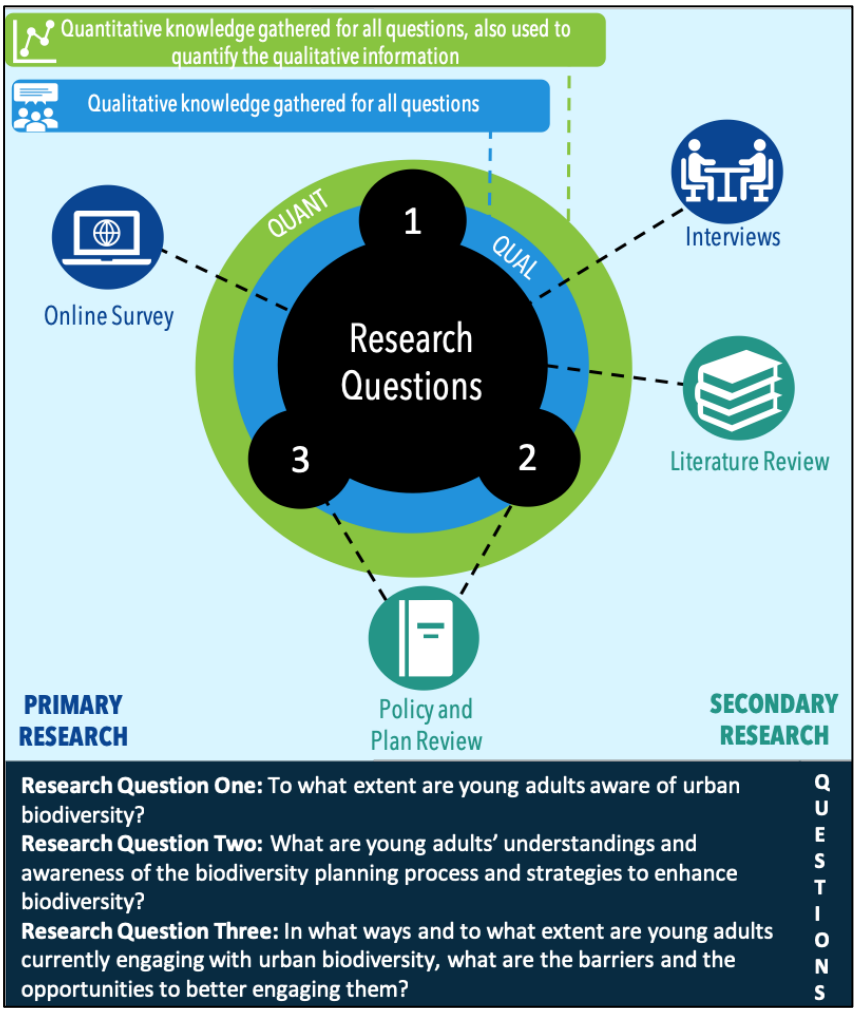

Figure 5: Diagram showing how the quantitative and qualitative data, as well as primary and secondary methods are used in this research. Source: Author.

3.4.1 Primary Methods

A mixed-methods approach that includes quantitative and qualitative data was adopted to address the research aim and objectives. This approach is accepted as a practical approach to research in social science disciplines as it allows for both qualitative and quantitative knowledge to be used together (Chapman and McNeill, 2005; Lewis-Beck et al., 2004). This research primarily looks at perceptions young adults have of biodiversity management practices, their knowledge on biodiversity and then their current engagement patterns, barriers to their engagement and opportunities to better their engagement. Qualitative data were mainly collected through interviews and some open-ended questions in the questionnaire survey, while

quantitative data were collected through the survey (Appendix 2). It was necessary, that while collecting information on engagement patterns and knowledge, the data could be quantified in numeric forms to enable cross-comparisons between knowledge and engagement, study area and engagement and more. Quantitative methodology is based on a positivist philosophical approach, one where theoretical principles are based on objective reality, and the idea that there is one truth (Sarantakos, 1998). The quantitative parts of the survey were added to acquire objective data. A quantitative methodology allows a researcher to arrive at a theory that is free from assumptions and speculations (Tolich and Davidson, 2018). Purely relying on the quantitative knowledge acquired through the survey would leave gaps in this study as the personal experiences of young adults and their perspectives on issues are vital. So while measuring the number of positive responses to an environmental activity is essential, is the collection of the reasoning behind the positive responses, which includes more elaboration of perspective.

3.4.2 Online Questionnaire Surveys

An online, self-administered survey was selected to be the primary research method for several reasons (Appendix 2). An online survey was chosen over a physical survey as it can access a broader range of people within the age group, via different media channels (Tolich and Davidson, 2018). For example, the survey was distributed to young adults across New Zealand via social media such as Facebook and Twitter, can be emailed across universities and to different classes. The research requires the collection of standardised (and thus comparable) information from young adults between the ages of 18-25 years in New Zealand. This research is complex and requires a large number of responses to build an understanding of the way that young adults engage with biodiversity initiatives and their motivations and their barriers to engagement. The online survey consisted of both qualitative and quantitative questions allowing for number-based answers and answers that asked for experiences, perceptions or understanding. The nature of the survey allows for a greater number of responses than just interviews alone and can reach a more extensive number of people.

The survey questions included open-ended, closed-ended and multiple-choice questions to provide both quantitative and qualitative data. This also allowed for basic data to be collected (e.g. age, university, home) as well as information on experiences and perceptions relating to biodiversity management. Pre-testing of the survey was undertaken before being released to university students, to ensure that the survey was logical and able to be understood by people

who had no prior knowledge on the topic of biodiversity. The questions were sorted into different sections headed by different topics. Part 1 of the survey aimed to understand the participants' background and demographic information, and was titled "About Me", including what type of environment they spend the most time growing up in, their ethnicity, living situation, age and the town that they currently reside. Part 2 of the survey, titled "Knowledge of Biodiversity", aimed to understand the extent of the participants' knowledge on biodiversity in New Zealand. Part 3 asked about their green space interactions, Part 4 about what nature meant to them, Part 5 about biodiversity planning in New Zealand, and lastly Part 6 asked about their engagement in biodiversity projects, looking at barriers and reasons for engaging or not engaging. In total, 286 survey responses were collected across New Zealand.

3.4.3 Survey Distribution

The survey was advertised and spread via Facebook and through emailing departments within the University of Otago and Waikato University. It was then further spread through a snowballing method to reach a higher number of students across New Zealand. The survey was also personally introduced through visitations to first, second, third and fourth-year classes at the University of Waikato and the University of Otago. The visitations advertised the survey in person and gave people more information on the research and how they can help. Every willing respondent between ages 18-25 years were able to find the survey online and complete it if they desired to participate.

3.4.4 Semi-structured Interviews

Semi-structured key informant interviews were adopted as a supplementary method to the survey, in order to get more in-depth understandings of young adults' motivations for engaging or barriers to engagement and to further understand the knowledge-gap between young adults and biodiversity policy. Semi-structured interviews are recognised as an approach to interviewing key informants with a fluid and flexible structure (Lewis-Beck et al., 2004). They provide additional knowledge that informs ideas, such as stories, experiences, perspectives and their extensive knowledge on a topic, which is well suited to the interpretive and constructivist positions adopted in this study (Lewis-Beck et al., 2004). The key informants needed to have knowledge on the research subject prior to the interview being conducted, so informants were purposively sought on their position within an environmental group, or government agency (Magnusson and Marecek, 2015). Environmental planning in New Zealand consists of many

different tiers. At the top level, there is central government initiatives and groups like the Department of Conservation (DOC), then regional bodies and district bodies, and at the grassroots level, there are community and civilian groups. In knowing this, key informants within these different tiers were sought to get an all-rounded account of young adult engagement levels, activation approaches, and barriers to these. Key informants were identified to take part in semi-structured interviews as they possessed foundations of knowledge in things like volunteer coordination, community engagement, student volunteer perspectives and urban biodiversity management.

Key informant interviews were conducted in different places, chosen by the participant on all occasions. They ranged from informant's place of work, cafés and the University of Otago. Two interviews were conducted via phone call due to distance. Key informant interviews were conducted over three weeks, after the survey distribution. The recruitment of key informants was conducted through direct targeting and targeted nominations (Magnusson and Maracek, 2015). First was the direct contacting of stakeholders who had websites advertising their contact information and their role. The targeted nomination was second, where the research supervisors provided initial contacts of environmental groups in the Dunedin City Area. These people were then emailed and asked if they would be happy to take part in this research. Often this would lead to the provision of more contacts through emails, as the informants would often know more people doing similar work. At the end of each interview, a chain referral method was used by asking informants if they knew of any further contacts that may be helpful to this research. In total 11 key informant interviews were conducted with a total of three student based groups, two community environmental groups, one local government agency, one national environmental group, two central government agency representatives, one urban ecosanctuary and one penguin conservation group (Table 2).

The analysis of key informant information gathered through the semi-structured interviews was completed over several weeks. Interviews were recorded using a mobile phone or audio recording device and were transcribed straight after. Transcriptions were typed out in word-for-word versions to ensure no information was lost, and the full essence of the conversation was captured (Bazeley, 2013). During the transcribing key ideas and themes were recorded and measured against the research objectives to see how they were aligned to the aim. The themes (matched against the research objectives) formed the codes for the analysis of transcriptions, with the transcription material then being organised into these codes.

Table 2: List of key informant interviews and focus groups taken

General Position	Code
1. Student Environmental Group	KISG1
2. Student Volunteer Agency	KIUOV
3. Student Volunteer Group	KISG2
4. Community Environmental Group One	KICG1
5. National Environmental Group	KING1
6. Dunedin City Council	KIDCC1
7. Urban Eco-Sanctuary	KICG2
8. Community Environmental Group Two	KICG3
9. Dunedin City Council	KIDCC2
10. Government Environmental Agency	KIG1
11. Penguin Conservation Group	KIPG1

3.4.5 Secondary Methods

To limit the potential bias from key informant interviews, secondary sources were analysed, which included existing research on young adults/ university students and their engagement patterns in other countries, policy documents and media releases. The analysis of secondary sources was also vital in adding to information acquired through the survey and key informant interviews and also allowing the information collected to be measured against existing policy and similar research from international case studies. Research Question Two requires a policy and plan analysis to be undertaken to look at the way in which biodiversity planning policies are written and how they may be received and accessed by young adults including those with limited interest in biodiversity. This was in order to assess the education to action models that the government often suggests will enhance engagement. For example, examining the educational component or persuasiveness of these documents to enhancing the probability of community pro-environmental behaviour or action. It was also essential to conduct a policy and plan analysis to see whether the general perceptions young adults had on biodiversity and its state in New Zealand (acquired through the survey results) were similar or the same as what was written in biodiversity strategies, environmental reporting series and action plans. Having an understanding of the biodiversity policies at the national and local level as well as community biodiversity plans will help to develop a foundational understanding of existing

structures, formal planning instruments and how these can be better used by the public (and in this case more specifically under-accessed groups like young adults). The policy analysis also provided a foundation for the planning context of this research, situating it within public participation opportunities and how biodiversity is planned for in New Zealand.

Analysis of literature was a supporting qualitative method to help in analysing the trends found in survey results as well as supplement key informant interview results. It is essentially a content analysis that grounds the research in a wider body of similar studies allowing for cross-comparisons to add meaning to the results. Academic literature was necessary to establish themes and key theories surrounding the importance of urban biodiversity management and civic participation, patterns of engagement, pro-environmental behaviour theories and young adults understanding of nature that are key for planners dealing with environmental management.

3.4.6 Ethical Considerations

Before any field research began, Ethics B approval was obtained through the University of Otago. The ethics form was completed to ensure that the design of this research had ethical consideration for participants. It was also to ensure that participants and key informants to this research could be anonymous if they wished, and secured confidentiality of their details and information. While surveys were the primary means of data, semi-structured interviews were used as supplementary to further delve into young adults engagement in biodiversity management. Thus ethical considerations needed to be front and foremost. The semi-structured nature of the interviews means that the questions were not concrete before the interview, and the line of questioning would not accurately anticipate all the topics that would be discussed. To ensure that conflict and ethical issues were avoided, all participants were provided with an information sheet before the interviews which stated that they were able to withdraw at any time if they wanted without any disadvantage to them (Appendix One).

3.4.7 Limitations to methodological approach

The data collection was conducted over three months during which there were student examinations and the mid-year university break, which meant students were likely on holiday, but the fact that the survey was online meant that there was more possibility it could be carried out effectively. Only two universities were directly approached, which is not entirely

representative of this age group, but efforts were made to talk to students from different universities as well as different study areas which may influence their knowledge. Thus, the sample size of the survey meant it focused primarily on two universities and students rather than a wider general young adult population. Also, gathering data from young adults who were not tertiary students was also difficult, and they were not as greatly represented in this research.

3.5 Researcher Positionality

It is essential to pay attention to the positionality and power relations of the researcher with research participants, as these can influence the outcome of the data collected (Sultana, 2007). The positionality of researchers can directly impact the accuracy of knowledge acquired by participants as their interactions with individuals have the potential to alter, dependent on the familiarity of participants of perceived power-differences (Sultana, 2007). A researcher's positionality encompasses their background and beliefs, while reflexivity is the researchers' personal and political ideologies that may interact with participants when conducting the research (Jones et al., 1997).

I am a student researcher at the University of Otago, who identifies as a 22-year-old female of European descent, with an educational background in human geography and planning. An interest in biodiversity and planning stemmed from a close upbringing with nature and an interest in human – nature connectedness. With the addition of planning, this interest became an inquiry into what motivates the public to engage in their environmental management for the public realm. This research has a strong ethnographic focus that explores young adults' (between the ages of 18-25 years) engagement levels in urban biodiversity management as well as seeks to explore the barriers and opportunities with the aim of understanding how their engagement can be enhanced. My age being within the participant age group has not resulted in a bias towards certain agencies or groups, nor did it affect the conversations had with key informants as there was no power play to be had or fear of disagreement between myself and the informants. Instead, having a similar age to the group being researched allowed me to have greater access to groups within universities that may otherwise be hard to access, and I was able to obtain key informant information on why some people weren't engaging with environmental activities which may be difficult for some researchers. I was also able to understand the avenues used by young adults to seek information, including social media channels and understood the young adult's constraints with time and access to vehicles. On the

other hand, being within the same age group has meant that some key informants who were older and in more managerial roles may have been cautious about saying certain things regarding young adults' participation to not offend me, despite my position being neutral. However, the interviews were relaxed and no obvious hesitancy was detected.

3.6 Conclusion of Methodology

This chapter provided a justification and explanation for the mixed-methods approach that was chosen to conduct this research, requiring both qualitative and quantitative methods of data collection. The theoretical underpinnings that influenced the selection of the research approach were outlined and how these influenced the research aim and questions. The processes of interviewing 11 key informants were discussed as well as a justification for the inclusion of secondary methods for this research. Positionality and ethical considerations were also addressed. The results of these methods are presented and discussed in the following chapters.

4. Young adults' awareness and perceptions of biodiversity

This chapter examines young adult's awareness of biodiversity and biodiversity loss in New Zealand and their perceptions of urban biodiversity.

4.1 Introduction

This chapter explores young adults' understanding of biodiversity and perceptions of biodiversity management in New Zealand. The results of both key informant interviews and online survey answers are used to explore this. Specifically, this chapter addresses **Research Question One** which is **'to what extent are young adults aware of urban biodiversity and biodiversity in general?'** The structure of this chapter looks at: (1) young adults' awareness and understanding of biodiversity loss, the term biodiversity, and biodiversity in urban environments; and (2) young adults' perceptions of biodiversity management in New Zealand.

4.2 Young adults' awareness and understanding of biodiversity

Mayo (2012) believes that the majority of empirical knowledge on people's perceptions, values and experiences surrounding nature has severely underrepresented those aged 18 to 24 years. As part of this thesis research, young adults across New Zealand between the ages of 18-25 years participated in an online survey (N=286). Section 5 of the online survey asked participants questions that would allow the assessment of their level of awareness and understanding of biodiversity and its management in New Zealand. Some key informants also provided information regarding young adults' awareness and understanding. The next sub-sections present the results regarding education and awareness, understanding of biodiversity and biodiversity loss, and awareness of urban biodiversity, and discuss the major findings throughout.

4.2.1 Education and understanding / awareness of biodiversity

Key Informant DCC1 said "The Council and DOC see education as an important step to get people to value biodiversity, and the next is to take action and to take action you need to be educated". Overwhelmingly, when survey participants were asked if they thought education

surrounding biodiversity was prominent in New Zealand schools, the majority of respondents said "No, it could be better" (Figure 6).

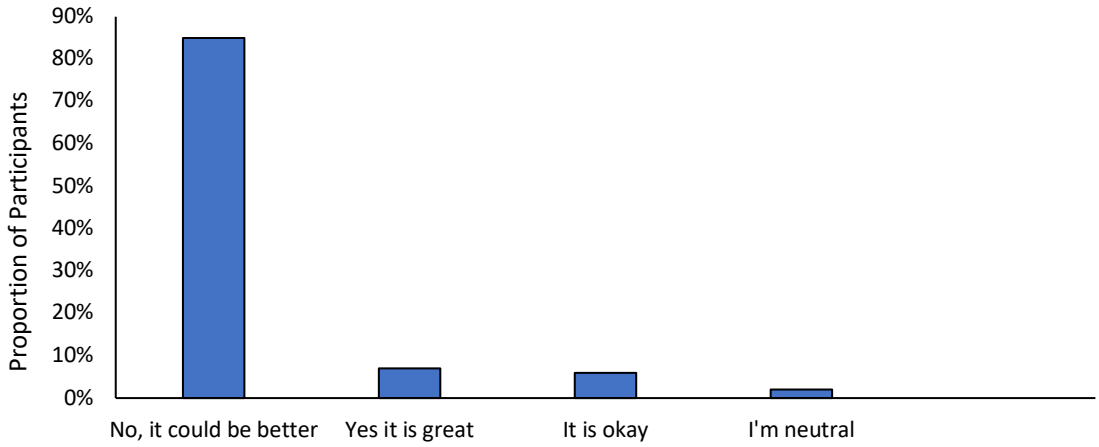

Figure 6: Young adults' (aged 18-25 years) perceptions of environmental education (biodiversity focused) and prominence in schools. N=240.

With 85% of survey participants regarding school education on biodiversity as not prominent enough (Figure 6), it begs the question 'how are young people supposed to take environmental action as they grow older, if they aren't being educated on biodiversity loss and the importance of biodiversity at school?'. Key Informants SG1 (student environmental group), CG2 (community group) and G1 (government agency) expressed concern with young adults' lack of awareness. Key Informant SG1 (student environmental group) noted the important role education on environmental issues has in motivating young adults to take action (Table 3).

Table 3: Quotes on young adults' awareness of biodiversity

KICG2	"…the statistics about students in Dunedin even knowing the ecosystems here exist is just so low…"
KISG1	"…seeing the negative things and gaining more knowledge on negative repercussions of actions…that motivates me to find out more and do something about it."
KIG1	"You look at Dunedin and you have the beach, natives, town belt, tui population. The lack of young people's awareness of this here is an education problem…"

Educating individuals on biodiversity loss can contribute to heightened environmental consciousness, especially for those living in urban environments. Hostetler et al. (2011) say that wildlife-centred education is of utmost importance to foster pro-environmental attitudes. However, public education on environmental issues is not comprehensively conducted in New Zealand under any specific programme. Educating the public on biodiversity may be viewed as too difficult; Van Weelie and Wals (2002: p. 1143) argue that 'biodiversity' is an 'ill-

defined' concept meaning "it cannot be captured by single or universally applicable definitions". However, 'biodiversity' is not a difficult concept to teach. Rather, its ability to be interpreted in many ways gives educators the flexibility to insert 'biodiversity' into many different contexts. This gives young adults more room to attach personal meanings to the concept, and having a personal connection to issues such as biodiversity loss helps to develop a stronger pro-environmental disposition (Kollmuss and Agyeman, 2002). Thus, the ambiguity surrounding the term 'biodiversity' and its many concepts works in the favour of educators and environmental planners thus should be more freely incorporated into public lectures, eco-sanctuary visits and public green space plaques.

4.2.2 Young adults' understanding of the term 'biodiversity' and awareness of biodiversity loss

In total 46.3% of survey respondents said they grew up in a city. Generally, cities are places that are seen as disassociated from nature through hard landscaping and a perceived lack of wildlife (Taylor and Hochuli, 2015). Pyle (1993) suggests that living or growing up in a city can lead to an 'extinction of nature experience'. Thus, it was important to explore young adults' perceived knowledge of the term "biodiversity". The question asked, 'Have you ever heard of the term biodiversity?' and was a simple yes and no formatted question. A 'correct' definition was not required. It was more important to measure the percentage of young adults that believed they knew what it meant, as there are many different meanings within different cultures and groups in society. In the study by Spash and Hanley (1995) students and members of the public were both asked an open ended question regarding their knowledge of biodiversity with common words from students being "species" and "biological" and for the public "don't", "know" and "haven't", "clue" were the most common words in the answers.

Fischer and Young (2007) found that people were able to express rich concepts of biodiversity irrespective of their scientific knowledge, ranging from knowledge of the food chain and human nature interactions.When asked if they had heard of the term "biodiversity" the majority of respondents said 'yes and I know what it means', a quarter said 'yes but am vague about the meaning', and a small proportion had never heard of the term (Figure 7). In Spash and Hanley's (1995) survey of 125 students in the United Kingdom, around 44% to 50% of participants knew of the term "biodiversity". A large proportion of young adults in New Zealand knew of the term biodiversity, however, it is important to note that the two studies have a 24 year difference, and young people over the last decade have grown up with a heightened environmental

consciousness. In Spash and Hanley's (1995) research, an official definition of biodiversity was given to participants and they were then asked to rate how familiar they were of the term from 1 (being totally unfamiliar with the term) to 5 (being totally familiar with the term). The mean score for students was 2.09, meaning they were largely unfamiliar with the definition. This research did not ask how familiar they were with the term, but as shown in Figure 7, many were vague about the meaning.

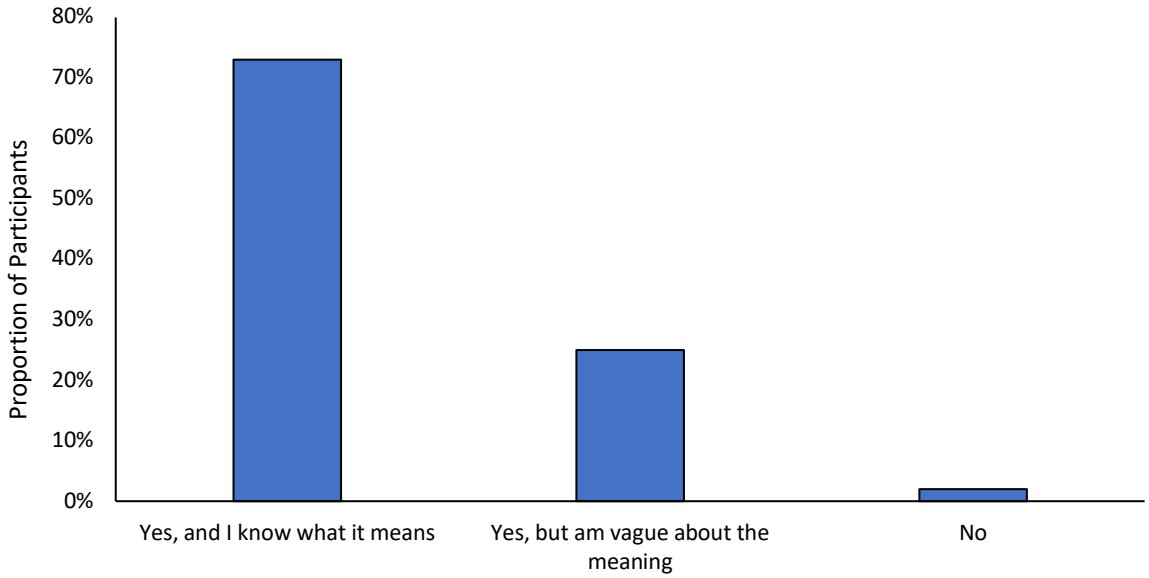

Figure 7: Survey participant (aged 18-25 years) answers regarding perceived knowledge of the term 'biodiversity'. N=265.

When responses from this study were further broken down, 100% of those who said they did not know what the term 'biodiversity' meant came from non-environmental subject backgrounds. For those who were vague about the meaning, 86% had come from a non-environmental subject background and 14% had come from an environmental subject background. As a whole, survey participants seem to understand what biodiversity means. For those who knew what the term 'biodiversity' meant, the majority came from environmental study backgrounds (Figure 8). In the study by Arbuthnott and Devoe (2013) it was found that young adults who had done a biology course had a much more positive association with biodiversity and better comprehensive understanding of the term 'biodiversity', compared to those who had not taken any biology course. This research is consistent with their findings. It is important to note that education on biodiversity through formal education institutes is not the only way one can be more educated. It may be that formal education on biodiversity is valuable for creating greater biodiversity understanding in urban environments, as there are less direct experiences available in everyday life.

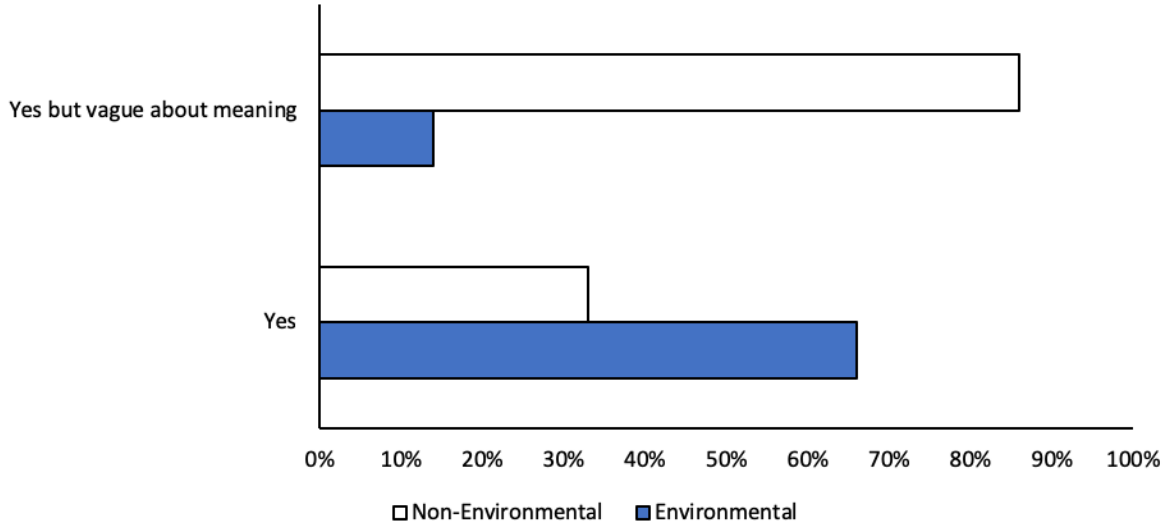

Figure 8: Graph showing participants' (aged 18-25 years) knowledge of the term 'biodiversity' and subject areas. N=260.

Key Informant G1 (from a government agency) believed that their past tertiary education in an environmental field had improved their awareness of urban biodiversity, but questioned whether the biodiversity awareness would have developed naturally or not if they had never studied that course:

> *"… in terms of native biodiversity my connection was non-existent until I came to uni. I was blown away by how much Dunedin has. But I do wonder, if I hadn't gone to university and still came here, would I have noticed the biodiversity?"* (KIG1)

When survey participants were asked if they think New Zealand's biodiversity is under threat, 94% of respondents answered with 'yes', in comparison to 6% who said 'no'. Thus, the majority of young adults within this study understood that New Zealand's biodiversity is under threat, a fact which is commonly mentioned in planning policy, social media and news.

Participants were further asked to identify the top five challenges for New Zealand's biodiversity, and were given ten threats to choose from (Figure 9). When asked what they thought were the top five challenges for New Zealand's biodiversity, introduced predators were declared as the top challenge overall. The next four challenges were 'urban growth', 'climate change', 'plastics', 'waste' and farming'.

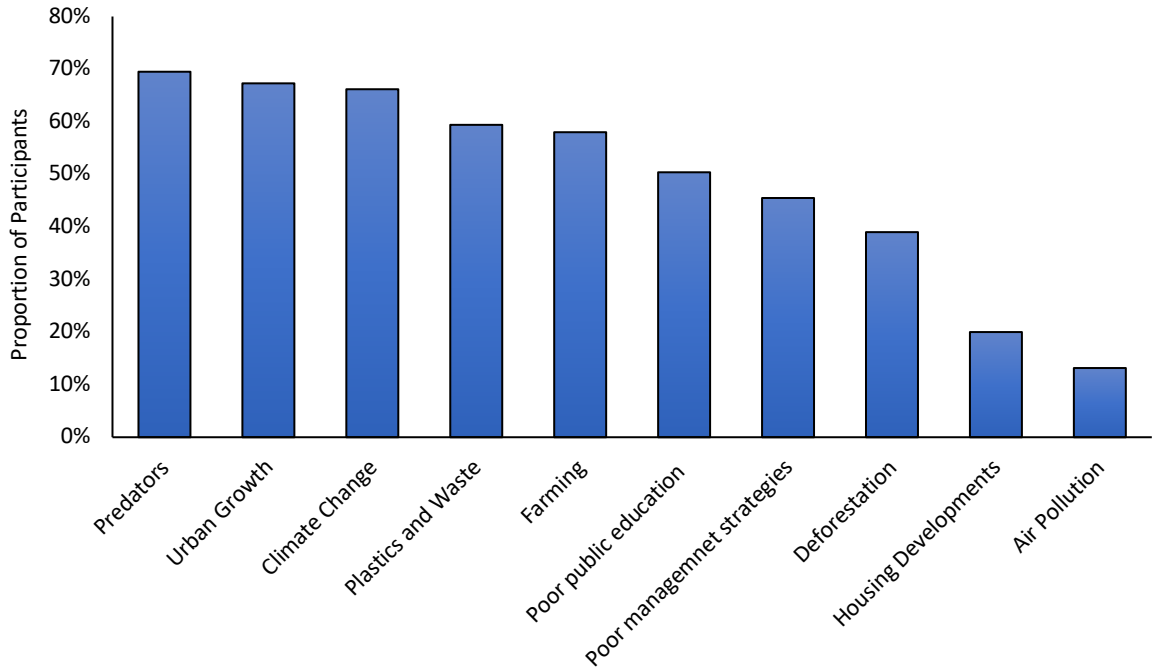

Figure 9: Proportions of participants (aged 18-25 years) identifying perceived top five challenges for New Zealand's biodiversity. N=266.

There has been a lot of media attention surrounding the threat of predators for native biodiversity, particularly the Predator Free 2050 initiative. Climate change has also been gaining media attention through the climate change marches and plastics have been an issue gaining heightened media attention with initiatives like reducing plastic bags in shops and microplastics in the ocean harming marine life. Thus the media coverage of environmental issues plays a large part in awareness.

4.2.3 Young adults' awareness of urban biodiversity values

As stated in section 4.2.2, 46% of survey participants said they grew up in cities, and around 95% currently lived in a city. It is vital that cities are considered in management directed at combatting biodiversity loss, not just because of the level of loss they have experienced, but for the potential that cities have in promoting positive change in large quantities due to their sheer population size. The fragmentation of cities' green spaces lead to an extinction of experience in that urban dwellers are not as connected to the natural realm as those living in rural areas (Bendt et al., 2013). Around 57% of respondents resided in Dunedin, where the visibility of biodiverse environments varies from place to place, with hills and the nearby Otago Peninsula having a large amount of green cover, and the central urban environment lacking in biodiverse green spaces. Twenty-two percent or respondents resided in Hamilton, which is a

city characterised by flat land and biodiverse gully formations weaving around the Waikato River. Others came from Tauranga, Auckland and Wellington, with some from Rotorua.

From the key informant interviews it became apparent that having an awareness of biodiversity when residing in an urban area was important, yet urban biodiversity was not a concept widely understood by the public. Having the ability to build nature connections while living in urban spaces is important not just for improving the likelihood of pro-environmental behaviours by urban residents but also for the cultural ecosystem services urban nature provides, such as recreation, a sense of place, and health benefits (Constanza et al., 1997). Arbuthnott and Devoe (2013) found that their university participants most frequently associated the 'meaningfulness of biodiversity' with pleasurable attributes and aesthetics. Therefore, they were more focused on visual benefits of biodiversity than its ecological services. Key informants were not explicitly asked about their thoughts regarding urban biodiversity connections, nevertheless Key Informants DCC1 (Dunedin City Council) and CG3 (student volunteer group) noted key ideas surrounding challenges and opportunities regarding people-biodiversity connectivity in urban environments (Table 4).

Table 4: Biodiversity connection and healthy urban populations

KIDCC1	"…that [connecting with nature] threads into mental health – if you have a healthy environment and you are connected to that environment you are a healthier person."
KIDCC1	"we are pretty lucky in Dunedin to have the town belt right behind us…[we] try and get more people using that town belt and there is a lot of value there in terms of native biodiversity"
KICG3	"…the idea [of the Wild Dunedin Festival] is that the events range in size and scale so that there is something for everyone. Because the whole purpose of wild Dunedin…is to bring people into the city, we are the key kaupapa we want to engage local people with the environment around them."

Key Informant G1 (government agency) extended the idea that connecting with urban biodiversity is important for people, but mentioned that it was something that a lot of people did not take notice of, or were not educated enough to take notice. *"…there is something around understanding urban biodiversity…most people are like 'what is that?...There is a bigger push to understand the value of biodiversity when you live right next to it [in rural environments] ...trapping in your garden in town is just as important as trapping out by the peninsula. People just don't know that!*" (KIG1).

In collecting the views of young adults on their perceptions of green spaces in urban environments, survey participants were asked how important they perceived urban green spaces to be to support a diversity of plant and animal species. From the responses, the majority of respondents said it was extremely important and a quarter said it was very important, 3.7% said it was somewhat important and around 0.1% said it was not at all important (Figure 10). These results show that an extremely low proportion of respondents believed green spaces were not important for supporting a diversity of plant and animal species. As 95% of survey respondents currently resided in a major city, the high level of understanding of the importance of green spaces for not just aesthetic reasons but for supporting urban biodiversity is promising. In a subsequent question, survey participants were asked if they believed increasing green spaces for biodiversity would also increase urban residents' wellbeing, and 89% affirmed that it would, with 10% saying that they thought it would but did not know exactly why.

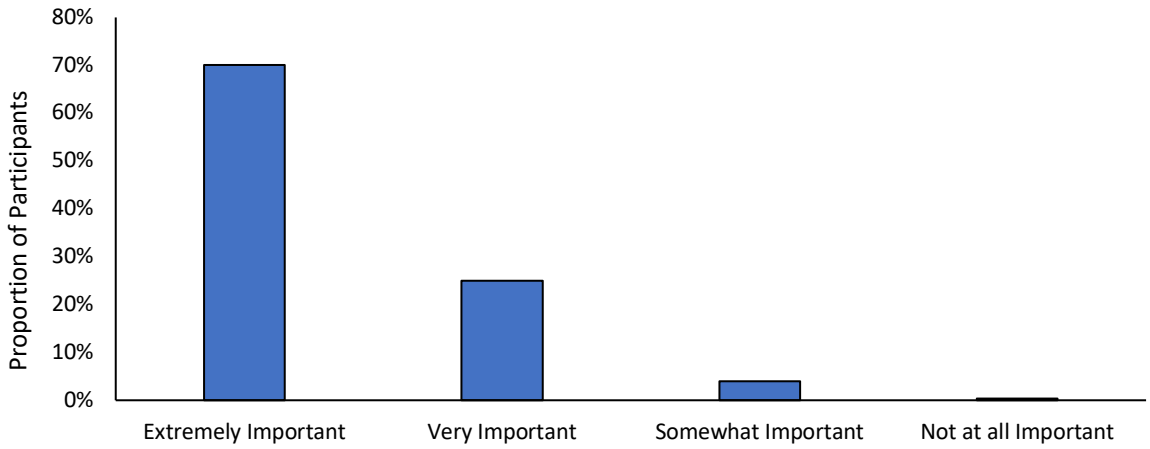

Figure 10: Survey participant (aged 18-25 years) perceptions of the importance of green spaces to support a diversity of animal and plant species. N=265.

In regard to their immediate environment (the town/city they currently resided in) participants were asked how biodiverse they believed it was. The results showed that the majority of respondents thought their city was moderately biodiverse and around a quarter thought it wasn't biodiverse at all (Figure 11). This question was designed to measure the perceptions young adults have of their immediate environment and measure the results of their perceptions against the biodiversity perceptions of the same city outlined in local policy. For Dunedin, the majority of young adults believed it was not a very biodiverse city, despite national indicators stating otherwise. It shows there may be a gap between actual biodiversity levels and what young adults perceive as being a biodiverse environment, and this may come down to poor education surrounding biodiversity or a lack of engagement with biodiverse spaces.

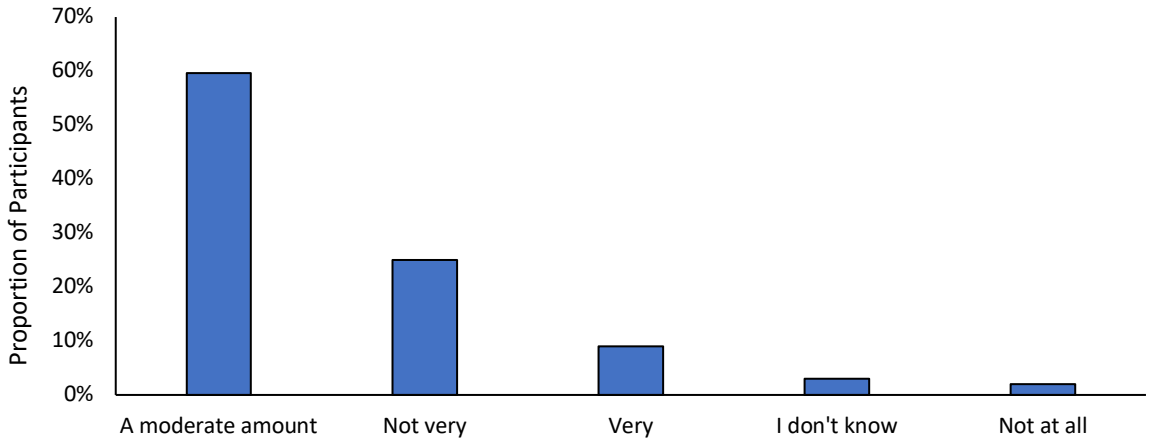

Figure 11: Survey participant (aged 18-25 years) perceptions on how biodiverse their city/town of residency is. N=265.

In the online survey, participants were asked to identify where they spent the most of their time growing up. Participants were to pick a category out of the following. In total, the majority of participants grew up in a city and the lowest proportion of participants grew up on a farm (Figure 12).

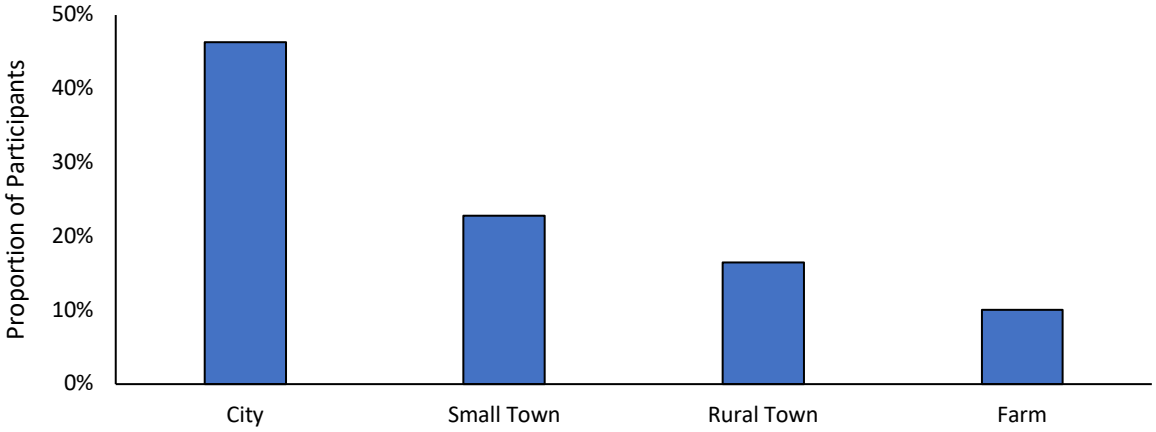

Figure 12: Survey participant (aged 18-25 years) answers on where participants spent the most time growing up. N=285.

Figure 13 shows perceptions of biodiversity richness in their city or town of current residency in relation to the places where respondents spent the most time growing up. It is clear that the majority of respondents believed their city to have a moderate level of biodiversity. Looking at those who answered "very", the majority are from small towns and the same goes for those that said, "not at all". Those from rural towns answered the most in regard to not knowing the biodiversity level of their city. For those who responded, "not very", those who spent the most

time on farms and small towns growing up were more likely to perceive their current city of residency as not very biodiverse.

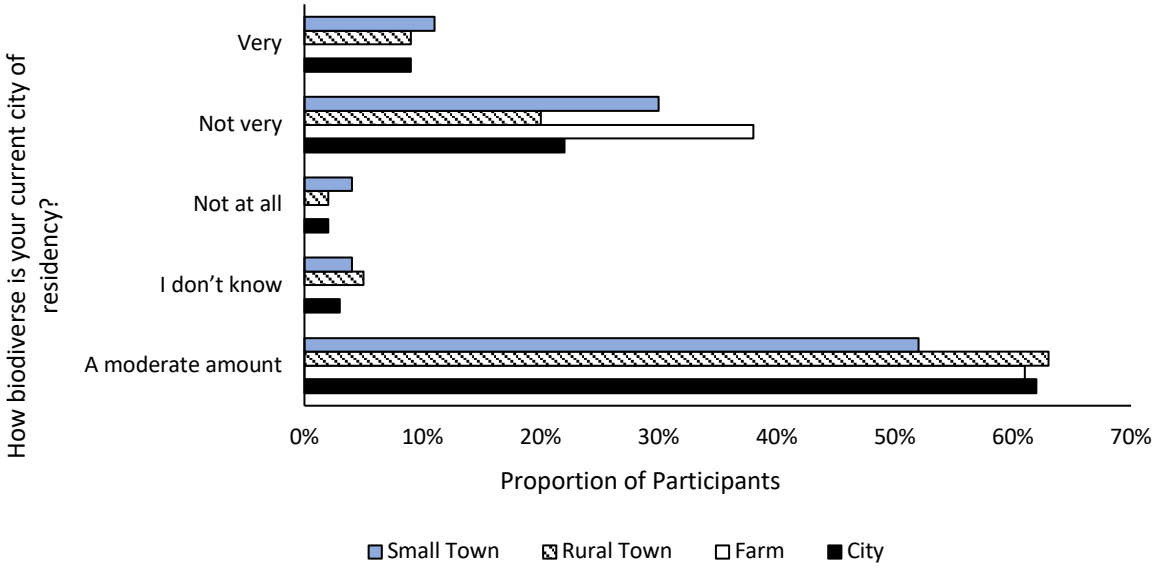

Figure 13: Survey participant (aged 18-25 years) perceptions of biodiversity richness of current city in relation to where they spent the most time growing up. N=265.

Young adults' awareness of urban biodiversity can vary depending on a number of factors. While the biodiversity of a city may be rich, it comes down to perception, knowledge of biodiversity and individual baselines against which biodiversity is evaluated, and these are likely to be built from lifetime experiences (Hein et al., 2006). For example, if someone came from a biodiversity-rich rural environment and moved to a city their perception of the city's biodiversity may be that it is not rich compared to that of their home environment. The survey data show that young adults from small towns and farms perceived the city of their current residence as being not very biodiverse, whereas students from cities perceived it as biodiverse.

When asked about their awareness of green spaces in their current neighbourhood of residency 86% of participants were aware of the presence of green spaces, and 14% were not aware. For those that were not aware they were asked why they believed this to be the case through identifying all options that apply. Twenty of the 35 respondents identified that they had busy lifestyles with study and work, and 13 respondents were new to the area and therefore were unaware of the local greenspaces. Seven picked that they were also an indoor person, and seven also stated that there was no green space around them. Integrating green spaces into the everyday lives of urban dwellers is extremely important for increasing the opportunity to passively experience nature (Soga and Gaston, 2016). Soga and Gaston (2016) argue that it is

most important to create biodiverse green spaces in neighbourhood environments as these are the sites encountered daily by individuals, therefore having strong opportunities for nature experience in neighbourhoods is vital. The fact that 86% of participants were aware of the green spaces in their neighbourhood of residency is fantastic for cultivating a sense of connectedness to nature that is so vital for urban dwellers to have.

When survey participants were asked how they felt about the amount of green space provided in their city of residency 38% of respondents acknowledged that they were neither satisfied nor dissatisfied with the amount of green space. Thirty-five percent were satisfied and 19% were dissatisfied with the amount of green space. Survey participants were also asked how much they enjoyed spending time in green spaces in their current city of residency. The majority of respondents enjoyed spending time in green spaces in their city a great deal (Figure 14).

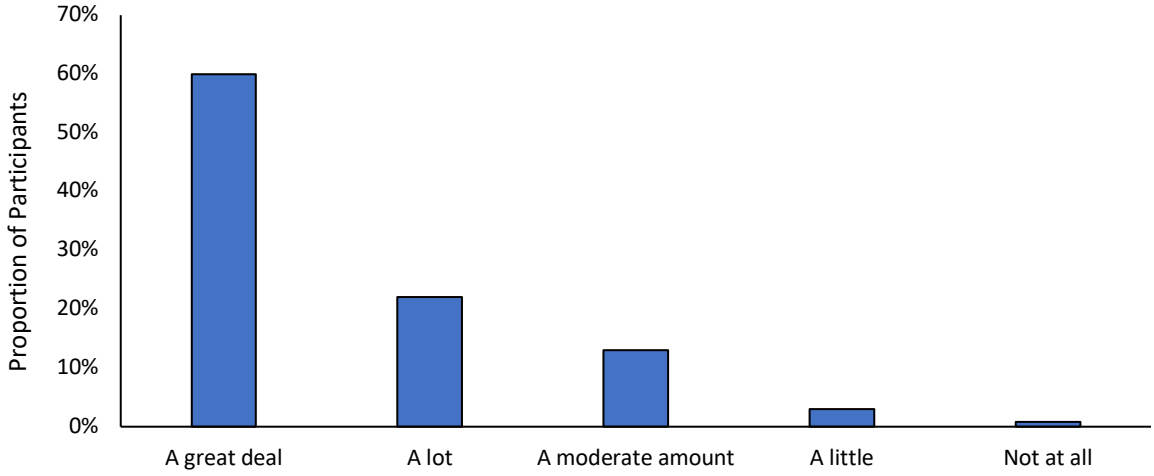

Figure 14: Survey participant (aged 18-25 years) answers on how much they enjoy spending time in green spaces in their current city of residency. N=244.

4.3 Perceptions of biodiversity management

When participants were asked how much funding should be allocated to biodiversity protection in the governmental annual budget and were given choices from $50 million to $1 billion. Twenty-seven percent of respondents stated that $300 million would be a good amount, with 26% stating $1 billion (which was mentioned as being equivalent to the current education funding). When participants were asked what kind of biodiversity management projects they would prioritise in terms of funding (they were able to pick more than one), 66% stated re-introduction of animals and plants into modified landscapes. Fifty-six per cent stated that national park wildlife protection should be prioritised, and 56% said supporting existing urban eco-sanctuaries (Figure 15).

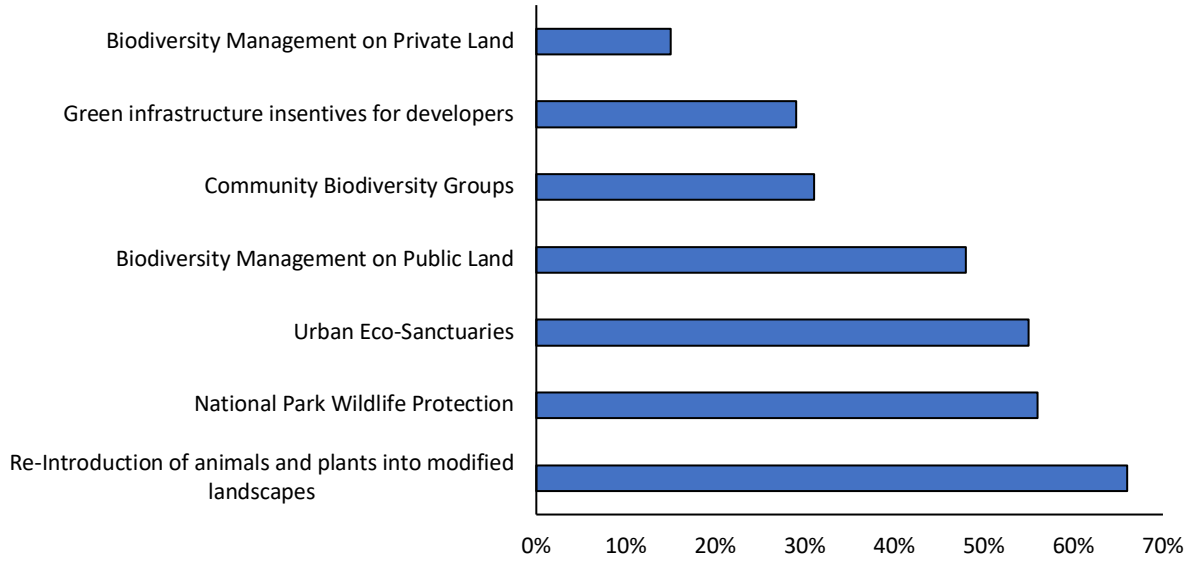

Figure 15: Survey participant (aged 18-25 years) perceptions of funding prioritisation for biodiversity management. N=267.

Biodiversity management on private land was the least selected in terms of being a priority for government funding. This could be because the education surrounding the importance and effectiveness of biodiversity restoration through private gardens is not as popular as large-scale projects on public land (Norton, 2000). The re-introduction of plants and animals into modified landscapes, such as cities, often requires communities to make efforts to improve habitat quality and remove predators from private land, by making changes in private gardens (Norton, 2000; Aronson et al., 2017) .

4.4 Conclusion on awareness

The results gathered in Chapter 4, to answer Research Question One contribute to the wider body of literature on young adults' awareness of biodiversity, biodiversity education and young adults' perceptions of biodiversity in urban spaces. Mayo (2012) argues that the values and perceptions of 18 to 24 year olds in regard to nature are poorly researched. This research found that the majority of young adults' believed education on the importance of biodiversity values was not prominent enough in schools, and that it could be better. Facilitating nature-connectedness in people at a young age is important to develop a pro-environmental ethic, and with biodiversity continuing to decline it is important that education surrounding biodiversity loss is available in schools. This research found that education on the state of biodiversity is important in motivating young adults to take some kind of action, as expressed by key informants (KIG1, KISG1). Education programmes are currently in place for children and

families, but there are no set education programmes for young adults to learn more about biodiversity. It was found that the majority of young adults' education on biodiversity had come from environmental university courses. This means that young adults who are not in an environmental university course may be excluded from accessing the same understanding of biodiversity. The majority of young adults had heard of the term biodiversity and felt that they knew what it meant, and of those participants the majority had studied or were currently studying an environmental course at university. For those that had heard of the term but weren't sure about its meaning, the majority had studied non-environmental subjects at university. This research shows there is a relationship between environmental education and heightened understanding of biodiversity in young adults. For those that were not in environmental education at a tertiary institution, access to knowledge on biodiversity loss or biodiversity was harder to achieve and this may deter this group from being involved in environmental action. However education is not the be all and end all. Rather, direct experiences with nature have been proven to be more effective in cultivating pro-environmental behaviours.

The majority of young adults lived in urban areas, and as cities are often associated with extinction of nature experience through less direct experiences with nature it is important to look into increasing the opportunity to experience nature (Soga and Gaston, 2016). The majority of young adults recognised that greenspaces in cities are extremely important to facilitate urban biodiversity. The majority also recognised that urban green spaces were important for human wellbeing, which is not something reflected in current biodiversity strategies but is often argued in literature. A high percent of young adults felt their cities of residency were moderately biodiverse, with around a quarter believing that their city was not biodiverse. When these answers were measured against the places they grew up in, it was found that young adults from small towns and farms perceived their current city of residence as not as biodiverse. Despite this, most felt they were aware of the green spaces in their city and the majority enjoyed spending time in these spaces. Young adults felt 'the reintroduction of animals to modified landscapes' and 'national park wildlife management' should be the priorities of environmental management and felt that 'facilitating biodiversity management on private land' was least important.

Overall, young adults have a solid awareness of biodiversity, urban biodiversity and biodiversity loss. Perceptions of biodiversity in a city may be influenced by where the individual grew up and relative nature levels between the two places. Education on biodiversity primarily comes from tertiary education which excludes young adults who are not in

environmental subjects or those who did not attend university from accessing the same opportunities to learn about nature. Overall, a mix of both creating more opportunities for young adults to have direct nature experiences (to increase awareness) and increasing the availability of biodiversity education (to increase knowledge) is desired to develop an individual's understanding of the importance of biodiversity and the severity of biodiversity loss, which then creates a strong foundation to cultivate pro-environmental engagement.

5. Environmental planning policy and young adults

This chapter examines the relationship young adults have with formal biodiversity planning instruments and local environmental strategies.

5.1 Introduction

This chapter presents the results found in answering **Research Question Two: 'what are young adults' understanding and awareness of the biodiversity planning process and strategies to enhance biodiversity?'** A mixed-methods approach to data collection was adopted, including both an online survey and key informant interviews. The goal was to find out young adults' awareness of planning documents, how young adults are involved in formal biodiversity planning systems and the presence of engagement strategies and action plans in the biodiversity management field.

While the focus of this study is primarily on the engagement trends of young adults in biodiversity management in New Zealand, an important foundation to understanding this groups' involvement is exploring their connections to the formal biodiversity management process. Young adults' awareness of planning strategies and documents, from international to local level plans, was measured through a survey with 286 participants aged between 18 and 25 years and discussed in key informant interviews. With environmental planning increasingly highlighting the importance of community involvement to enhance biodiversity outcomes, it is important to identify whether or not young adults are aware that these strategies exist, to understand why certain strategies are in place, what the strategies are designed to achieve and what their role is in management.

This chapter will present the following results: (1) key informant perceptions of the formal biodiversity management process; (2) community groups' involvement in the formal planning process; (3) young adults' awareness of and input into the formal planning process and associated documents; (4) outreach methods of formal biodiversity management bodies such as outreach methods by the Department of Conservation (DOC) and the Dunedin City Council (DCC); and (5) engagement strategies and policy-action issues.

5.2 Formal Urban Biodiversity Management: Government Agencies

Gaining an understanding of biodiversity management structures from key informants within environmental management fields is important in order to understand young adults' engagement with formal biodiversity management processes. It provides information regarding the multifaceted nature of biodiversity management and shows potential possibilities for increasing young adults' engagement in these processes. Of the key informants interviewed in this research, two were from national-level environmental groups, two were from local councils and three were from community environmental groups. These key informants were asked about the structure of biodiversity management in New Zealand. It was clear from key informant interviews that biodiversity management in New Zealand has a strong reliance on volunteers and community groups. Māori across New Zealand develop their own iwi management plans and environmental initiatives to address natural resource issues such as biodiversity loss and take actions towards shared management of particular conservation areas and land in general. Intertwined into management in New Zealand is also the Māori value of kaitiakitanga, guardianship of the natural landscape, which is translated through a partnership approach between the community, iwi and authorities to taking care of the environment.

5.2.1. The role of government agencies (national and local)

While key informants were not directly asked about national biodiversity management practices, five key informants made comments regarding biodiversity management at a national level and how it works (Table 5). The restructuring of the Department of Conservation (DOC) towards a business model has led to a greater reliance on local biodiversity management support. The community are increasingly expected to undertake biodiversity management projects facilitated through DOC. DOC's reliance on local biodiversity management to support the meeting of national targets was reported by key informants CG1 (community group) and G1 (government agency).

Table 5: Key Informant quotes describing urban biodiversity management at the national level

KICG1	"DOC has undergone a massive restructure in the last few years and they have gone from being a hands-on conservation organisation to an organisation who are trying to offload some of their work onto private citizens and organisations…"
KICG1	"There is that juxtaposition where DOC have offloaded some of their responsibilities and it seems to be a constant trend of…trust and private money. Council and DOC need to remember that they aren't just about governance, that

	they are about operational management and it's a big concern in NZ at the moment."
KIG1	"It [DOC's role] is about working with the community partners to say well okay how do we allow this to happen within the realms of conservation management strategies which dictate what activities can and can't occur in different parts of the country…"
KIG1	"…we [DOC] work with others to achieve great conservation outcomes and we are not big enough to achieve what could be achieved. The reality is, in New Zealand most people want to be involved, they have this green streak to them, and they want to do things... As a department we could do better looking at our work plans and saying where are the opportunities where someone with skills can come and connect…DOC doesn't recognise the value of people who have skills and want to volunteer"

Key Informants CG1 and G1 established that there had been a move from centralised biodiversity management to a greater reliance on local biodiversity groups (Table 6). Key informants DCC1 (Dunedin City Council) and DCC2 (Dunedin City Council) discussed the way that urban biodiversity management is navigated at the local level. Key Informants DCC1 and DCC2 referred to their biodiversity management approach as being one that focuses on facilitating community connectedness with the natural environment, and co-ordinates a small-scale volunteer aspect with a larger 'city-wide' approach.

Table 6: Key Informant quotes describing urban biodiversity management at the local level

KICG2	"…we really strongly rely on them [volunteers] it's a very important part of I'd say most conservation projects in New Zealand… volunteering contributes to our entire community all over NZ in all aspects…".
KIDCC1	"…the DCC view and I guess same for DOC they have similar visions and values about how people view the natural landscape and the big thing is guardianship. That word comes up a lot now. And connecting with natural landscapes and so there is the connection side and being a guardian – responsible for the land."
KIDCC1	"…one of the big priorities for the parks and rec strategy is that the natural flora and fauna is protected by the community and one of the priorities is restoring and enhancing native biodiversity, ecosystems and habitats. And the actions for that are to support and enable Dunedin-wide volunteer and education programmes so that individuals and families of all ages and abilities are able to contribute to our open space management framework"
KIDCC1	"…the environment strategy [Dunedin] focus is on improving the natural environment and taking care and increasing indigenous biodiversity and ecosystem services, that Dunedin people care for the natural world and their actions are to promote active learning about Dunedin's natural environments."
KIDCC2	"It doesn't say anywhere that it [the Dunedin City Environment Strategy] is DCC's environment strategy because it's the city's environmental ambitions. It takes a city environmental approach to delivering ambitions. We as DCC are one in the mix."
KIDCC2	"Whatever we do has to be aligned with biodiversity strategy. I make communication happen between the groups…it's [biodiversity loss] a city-wide issue so we partner with the city."

5.3 Community groups and urban biodiversity management

As mentioned in Section 5.2, formal urban biodiversity management channels through government agencies have opened up and now rely more on local groups and community-led initiatives to support higher-level strategies. With a greater reliance on community groups, the need for good volunteer outreach to target members of the wider community who are environmentally inclined or volunteer-focused has increased. Typically, environmental stewardship existing within a community group comes from a pre-existing sense of community within a space, or a collective sense of ownership over a natural area (Asah et al., 2014). Despite there being a strong presence of local community-led environmental initiatives, they are largely fragmented in the Dunedin context. What the fragmentation does is make it difficult to coordinate volunteers, exchange work plans and share resources with other groups and higher agencies.

In the online survey, participants (aged 18-25 years) were asked 'whose job should it be to organise urban biodiversity management initiatives?'. Options that they could choose included Community Groups, Local Council, and DOC (as the national environmental body representative). When answering, 31% of participants opted to use the 'open-ended' answer section to state that they believed a combination of all three was ideal. Thus, Figure 16 incorporates these answers. Overall, 'all three' and 'local council' were the most selected.

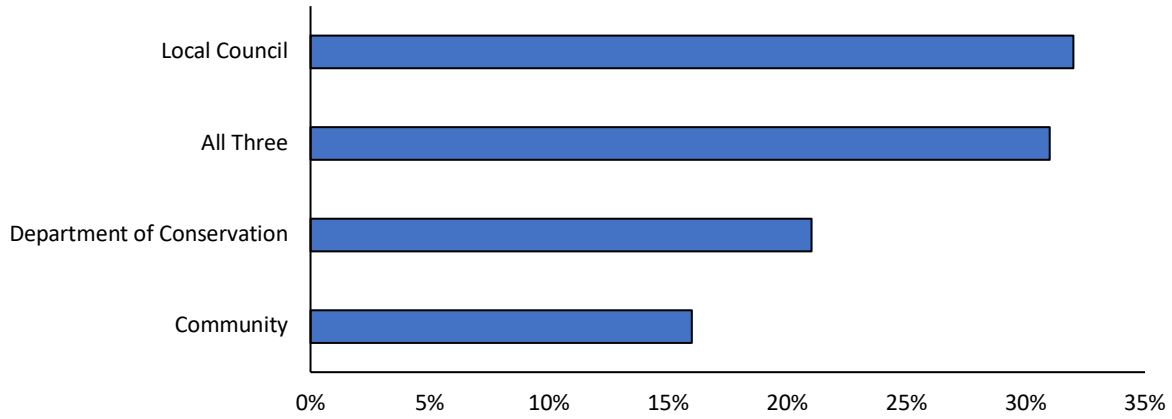

Figure 16: Survey participant (aged 18-25 years) answers on whose job should it be to organise urban biodiversity management initiatives. N=242.

Table 7 presents some of the open-ended answers that indicated a combination of all three groups was considered best for organising urban biodiversity management initiatives; e.g., mentioning that all three have their own strengths and that they all had their place in contributing to successful management.

Table 7: A few of the open-ended responses from the survey on whose job it should be to organise initiatives

Whose job should it be to organise biodiversity management initiatives?	"You can't consider them independently if thinking about implementing conservation initiatives. They all have their place in a multiagency response"
	"Realistically it should be a community thing, fuelled by information from the council / DOC so that the right initiatives are carried out"
	"All of them together, the different groups would have different ideas and target different sites / areas"
	"It takes all entities to make local conservation successful"
	"Everyone should be doing what they can and working together – the burden should not fall on one group"
	"All of them [Council, DOC, Community groups] at different levels"

Key Informant G1 (government environmental agency) stated that in New Zealand there are around 600 community groups working on public conservation land, which is *"not necessarily coordinated at the national level but is close to being coordinated at a local level"*. In Dunedin, an example of coordinated biodiversity management is through the Predator-Free 2050 Dunedin initiative, which is characterised by multi-sector collaboration between community groups, NGOs, Crown Research Institutes, the Dunedin City Council, The Otago Regional Council, the University of Otago and national organisations. Key Informant CG1 (community environmental group member) stated that for the most part community groups' involvement in biodiversity management tends to follow the identification of a shared goal. Rather than following a local biodiversity management strategy, they find an issue and decide to work together towards addressing that issue. This lack of strategic thinking often leads to fragmentation in the wider scheme of biodiversity management due to the issue or goal not being overseen from a national level, or groups not being required to share resources or information through any formal top-down process. Peters et al. (2015: p. 180) emphasise that for effective community group operations collaboration is key, "especially where there are complementary restoration objectives". Table 8 displays quotes by key informants regarding the fragmentation of community groups.

Table 8: Problems with collaboration between different groups: Fragmentation

KIDCC2	"Yes, there is [disjointedness between community environmental groups]. That's fair to say that. It was raised recently in a grant application by one of them…there is a lot of people out there doing amazing stuff, but they aren't doing it together."
KICG1	"Councils and DOC need to remember that they aren't just about governance, that they are about operational management and it's a big concern in NZ at the moment. Community groups are competing for resources. In some respects, all of the Peninsula groups should join together and be one organisation….and the thing is the Yellow-eyed Penguin Trust and biodiversity group and STOP are

	roughly the same. But they have a demarcation between different projects for some reason."
KICG1	"I look at the success of the biodiversity group – how do we link their work up with the Yellow-eyed Penguin Trust and DOC and others...how do we work on obtaining the energy for a bigger goal. Each group has its own goal…There is a lot of compartmentalisation, we have wetlands society, bush group, dune group…so it's fragmented"

Essentially, local level community groups are not coordinating with each other. The groups are not coordinating underneath a local environment strategy or action plan and are not sharing resources between each other. As well as fragmentation, five key informants had mentioned poor communication between groups as decreasing the likelihood of successful collaboration and long-term tracking of collective progress (towards biodiversity enhancement in an urban area) (Table 9).

Table 9: Problems with collaboration between different groups: Communication

KICG3	"We have no stats. It's really hard to say if we would adopt it [a science communication strategy to show meaningfulness of the work], we don't have a Wild Dunedin property you know. We are kind of an umbrella that facilitates rather than organises. Sinclair Wetlands may have a planting day but hard to know how much effect our event had on them in comparison with their day to day running. I suppose you could try separate it but it's hard."
KIDCC2	"[on talking to community groups] it's mostly through the grant process."
KICG1	"…policy is driven by the need of DOC and local government to justify their governance and on a policy level, community groups don't look to policy…I think they exploit policy to find funding. But I don't think they look to policy to say this is what drives our group. What drives it is a particular issue."
KIG1	"…there is an agreement that we want to work together that we want Predator Free Dunedin that's come with that, but we aren't sharing resources. So, place 'A' could have amazing education resources to deliver to the valley, then you have peninsula and wetlands…whether we are actually sharing knowledge and survey info and stuff like I think we could be friendlier with each other. And there is probably a question there in what would drive that connection and create a space where we could have a forum that people talk about the way they are tackling particular plants or 'this is the education activities we are doing' so we can share resources."
KIPG1	"There is competition around conservation groups, like Orokonui takes a lot [of volunteers]."

During key informant interviews Key Informant G1 emphasised the importance of coming together around a strategy, so that environmental management works from the top-down around a collective goal. Having a top-down management approach to connecting community groups around shared goals may counter-act the fragmentation and communication issues between community groups. Key Informant G1 stated *"even just starting a conversation*

between different environmental groups working in a similar area [would be beneficial]". DOC is currently experimenting with this approach through having conversations in the Mackenzie Basin with key parties in the area to develop a shared vision for the space which they can then work together on managing. In the case of Dunedin, DOC believed it was more natural to work with already existing community visions for an environmental space such as biodiversity management, as it is more organic, rather than enforcing a top-down management approach and saying *"let's create this",* which is more forced. But again, it is harder to re-organise a variety of environmental groups working towards successful urban biodiversity management when each group has their own goal, Key Informant CG1 alludes to this, mentioning *"With each group having their own goal there is a lot of compartmentalisation like a wetlands society, a bush group, a dune group and that does not result in efficient management".* It's a complicated biodiversity management issue, but one that is being discussed and debated to find the best solution to enhance urban biodiversity management outcomes at the local scale, and ensuring the groups are contributing to national-level biodiversity goals (see quote below).

"… it's interesting because Predator Free Dunedin is a group of individuals already doing stuff and coming together to say hey let's do something about this vision! Versus Mackenzie Basin where DOC is coming on top of an area and saying let's create this which is more forced rather than the natural and organic 'community-based version' of biodiversity management. Whether you have more buy-in in Dunedin because community owns the projects or the DOC-led landscape scale approach where DOC has come over on top. You need a strategy. Even if its loose for momentum and conversation starting. We are trying to connect these people." (KIG1)

Peters et al. (2015) support the idea of seeking opportunities to align community groups' goals with regional and national biodiversity conservation objectives. Table 10 includes quotes from key informants that identify opportunities to enhance collaboration between community environmental groups to increase effectiveness of outcomes.

Table 10: Opportunities to enhance collaboration between community environmental groups

KICG3	"…we want to keep our presence throughout the year, so people think about us all the time. But also, there is more we could do around hosting events in other times, but our model is partnering and then they do the event and we facilitate it. Lots of opportunities there to collaborate throughout the year."
KICG3	"…Wild Dunedin doesn't want to organise events because we can't, as an umbrella organisation we are made up of other organisations. It would be too messy. But I think what we would need is someone to come forward and say I want to run an event for students, and we would then facilitate that to happen and that hasn't happened yet at all. We get huge social media engagement from

	students but then students don't go to the actual event. Maybe it's around trying to partner with an organisation that wants to target the students."
KISG1	"[The student-led environmental group] is for engaging all the different environmental groups. Like lets band together to make more impact. [We] had an environmental hui with environmental groups around Dunedin, the old guys and young guys, we were the only student group but yeah that was cool."
KISG1	"…so, the purpose of this strategy is to harness the energy and motivation of those people and groups [doing stuff in the community] to maximise available resources and connect people together. Making people aware of other people's work. To some extent it is working out. We have a youth representative on the partnership."
KIG1	"One of the things I have been pondering is whether the Departments [DOC] role could be that we identify the work, not deliver, but work with conservation volunteers NZ and they could deliver it and then we aren't drawing on staff here. They scope it and put the package together. Like you recruit and we will support with resources for the activity and we will achieve the greater good from that."
KIG1	"[On a local scale] Predator Free Dunedin has brought it [collaboration] together…recently we had a conversation and we sat here and had a meeting for Predator Free Dunedin and whilst not everyone came and there was a conversation around invasive plants rather than pests, Predator Free Dunedin brought together 23 partners from the area."

5.4 Young adults' awareness of and input into the planning process and documents

Section 5.2 and 5.3 presented and discussed the results regarding formal planning structures and community biodiversity management, but how do these findings relate to young adults' involvement? The fragmentation between community groups, local government and national government towards biodiversity management leaves young adults thinking "where do I fit in this" (KIG1). Young adults were identified by KIDCC1 as being a largely uninvolved group in terms of formal planning processes such as submitting on plans, and they are largely unaware of their local council's strategies for enhancing biodiversity (these results are discussed further within this chapter). This section (5.4) presents the results found in regard to young adults' awareness and perceptions of planning strategies and management processes at an international scale and a local scale. It also presents results found in regard to their willingness or unwillingness to engage with these documents. The majority of these results have come from the online survey which are direct answers by young adults, supplemented by key informant perceptions of young adults' engagement.

5.4.1 Awareness of biodiversity management documents

Survey participants were asked if they had ever heard of the International Convention on Biodiversity (CBD), which is a global multi-lateral treaty signed by 196 parties and all United

Nations member states (apart from the United States) (United Nations Environment, n.d.). The majority of survey participants had not heard of the CBD, despite it being the reason for national biodiversity strategies across the globe (Figure 17). In the study by Nisiforou and Charalambides (2012) 66.5% of university students had heard a little about the CBD, and 25% had never heard of it, others were unsure.

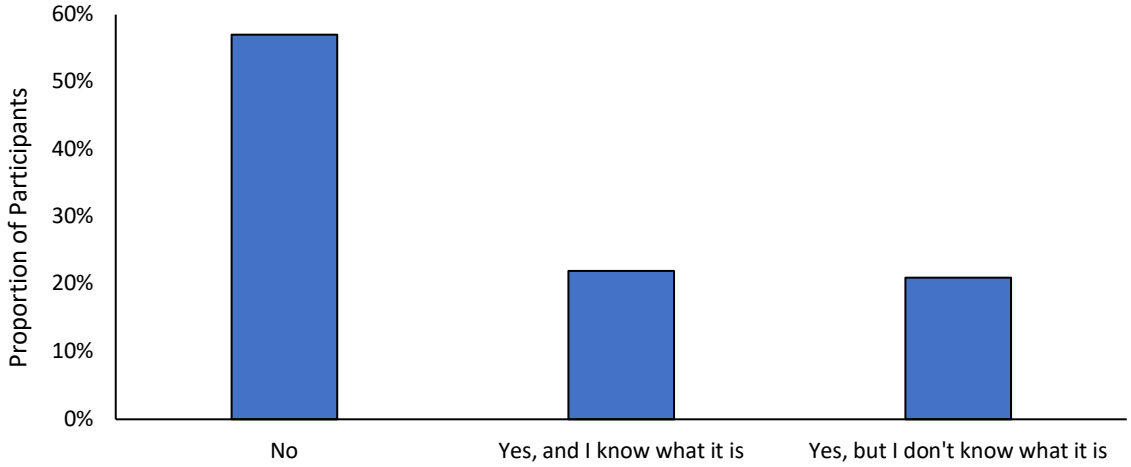

Figure 17: Responses by participants (aged 18-25 years) when asked: "Have you heard of the International Convention on Biodiversity?". N=244.

This research found that from the survey participants that had heard of the ICBD, 76% were majoring in 'environment-based' study areas which included planning, environmental management, biology, zoology, ecology, botany and physical geography. The remaining 24% were from 'non-environmental' subject areas including chemistry, human geography, physical education, philosophy and psychology.

Survey participants were also asked whether they had heard of the New Zealand Biodiversity Strategy, the highest-level biodiversity planning document in the New Zealand context. In total 47% of young adults said they had not heard of the strategy, with 29% stating they had heard of the strategy. Twenty-four percent of respondents stated that they had heard of the strategy but did not know what it was, its purpose and function (Figure 18). Of those that stated they were aware of this strategy and what it did, 74% were majoring in subjects related to the natural environment and 26% were from a non-environmental subject background.

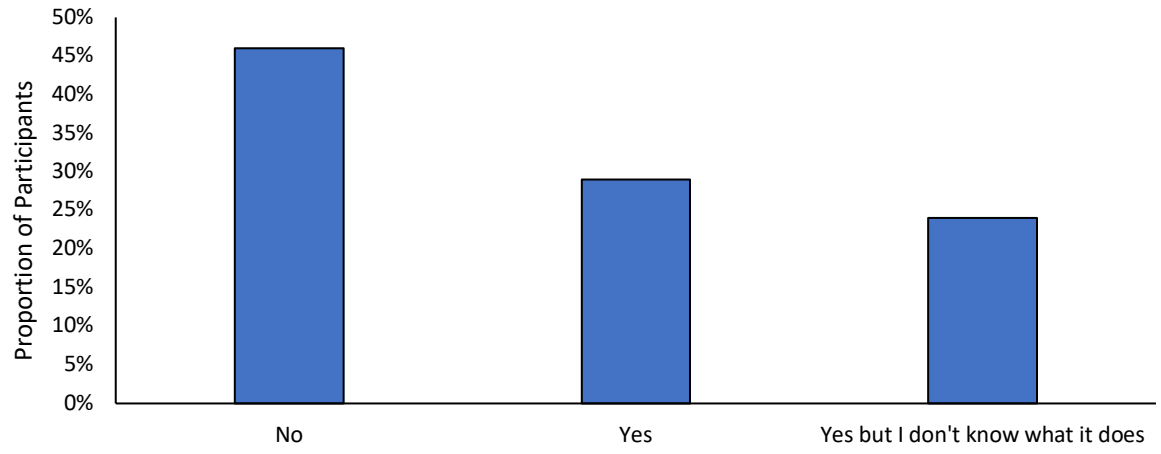

Figure 18: Responses by participants (aged 18-25 years) when asked: "Have you heard of the New Zealand Biodiversity Strategy?". N=244.

Participants were asked whether they were aware of Predator-Free 2050, a New Zealand initiative that seeks to rid the country of rats, stoats and possums by 2050. Answers were dissimilar to the previous results, as the overwhelming majority of respondents had heard of this initiative (Figure 19). Of those that said 'Yes', 68% came from environmental-based subject areas, with 32% coming from non-environmental based subject areas. Again, showing that there is a relationship between knowledge on biodiversity strategies and what an individual is studying at university.

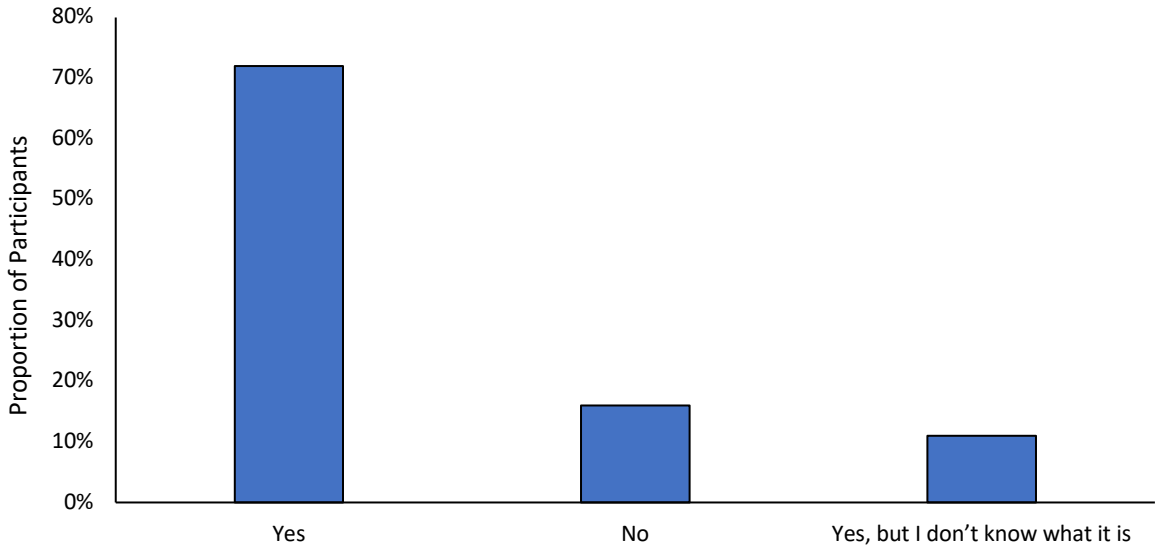

Figure 19: Responses by participants (aged 18-25 years) when asked: "Have you heard of the Predator Free New Zealand 2050 initiative?". N=244.

When participants were asked if they were aware of any biodiversity management strategies adopted by their local council 74% said 'no' and 26% said 'yes'. For those that said yes, most said they learnt of the strategies through university studies, and some said through interning at their local council, or social media. Again, most young adults that had heard of their local strategy were majoring in courses related to the natural environment (68%) with 32% from non-environmental subjects.

For participants who answered 'yes' to knowing of the International Convention on Biological Diversity (CBD), National Biodiversity Strategy, Predator-Free 2050, or Local Plans, a subsequent open-ended question asked where they had found out about these planning documents. Most found out of these strategies through their university course work, while others found out through social media, including the Department of Conservation Facebook page, and their local council website (Figure 20).

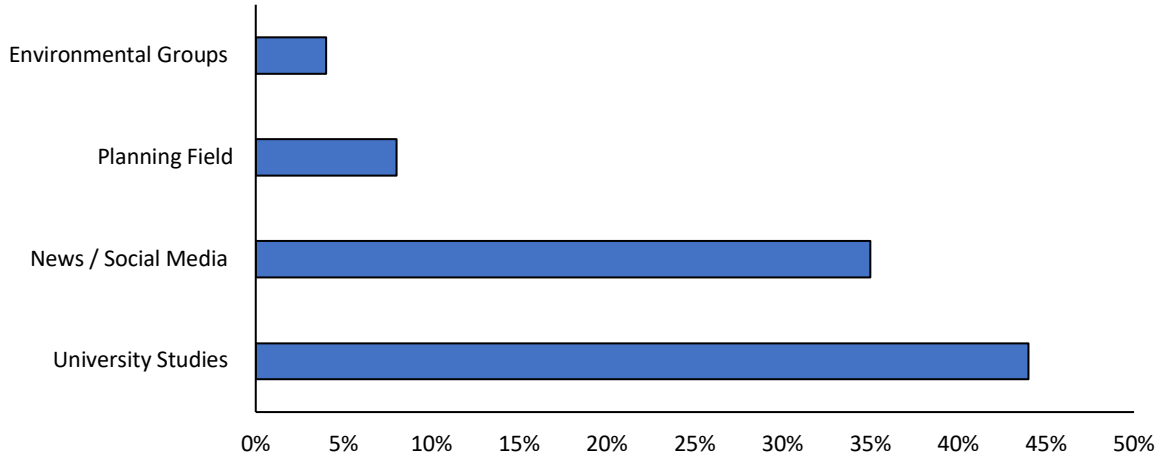

*Figure 20: How did survey participants find out about biodiversity strategies or initiatives. N=113. *Only top proportions are shown.*

5.4.2 Young adults' willingness to engage with formal management documents

When young adults were asked if they would read biodiversity management strategies in their spare time 58% said yes, and 42% said no. For those that said yes, when asked why they would read them, answers ranged from being interested in how things are managed, being interested because it related to their degree, and to be informed on what is happening locally. For those that said no, answers ranged from not being interested, and that they felt policy was not made for spare time reading (Table 11). Despite young adults' perceptions that these documents are inaccessible, KIDCC2 (Dunedin City Council Member) emphasised that the Dunedin Environment Strategy wants to involve everyone regardless of age and ability, and therefore

simple English was used throughout this document. However, it is not known if this strategy was read more than other strategies that may use less accessible language. Nowadays it is commonplace to write strategies in New Zealand using simple English to increase accessibility.

The 42% of participants that stated they would not read a biodiversity strategy were asked why, in an open-ended question format (Table 11). A number of young adults mentioned wanting to do things that are meaningful, rather than reading a strategy, which many referred to as not having a great effect in helping the environment. Many young adults think that strategies have no direct impact on helping biodiversity; "I can better spend my time actually making things happen rather than reading about something that probably won't"- Survey Participant. Many survey respondents mentioned the perceived inaccessibility of planning documents, however Key Informant DCC2 mentioned the following:

"The wording is not technical but it's a lot of words to go through. I think it's easy enough to read…one of the things I want to emphasise is that this strategy wants to involve everyone regardless of age." [on accessibility of plans to young adults]. (KIDCC2)

Table 11: Why participants (from survey) would not read a biodiversity strategy. N=97.

Perception of language accessibility	Perception of meaningfulness	Perception of time taken to read	Perception of document accessibility
"Those sorts of documents are often full of jargon and lack tangible applications"	"I would rather just get involved and told what to do rather than read about them"	"If it is a one-page document, I would read it. If not, I would not have the time to do that"	"Documents like that are usually inaccessible and it doesn't often occur to me to find and read them"
"Many are too long and wordy and don't overly concern me because they are usually ineffective… my actions are likely to be the same no matter what wording the government is using for their goals"	"I am more interested in opportunities / activities to actively make a change / improvement, I don't need to know all the details, just a general idea on why it will be beneficial"	"I don't have the time. If I have spare time that I can put towards environmental things, I'd rather do something with a more direct effect, such as reducing my waste"	"The general public may have difficulty accessing these if they are of a non-scientific background. Lack of awareness or understanding in some cases and not knowing the right people"
"They can be boring and little action is done to promote biodiversity in an appealing way"	"I can better spend my time actually making things happen rather than reading about something that probably won't"	"I do not have time. I do find social media posts helpful, and if I know I could do something to help then I would read it"	"I just feel like you wouldn't stumble upon that without directly searching for it….if I haven't heard about it I won't search for it"

"They are quite boring, even though I would like to be informed I won't take the time to read them because they'd be long and boring"	"I'd rather be actively involved, not reading"	"Takes too much time and I don't think to look them up and read about them. I would read them if they were short"	"It would need to be short and easy to read, important information with access to more for those that want it"
"Sounds very long and filled with a lot of jargon"	"Too busy actually planting trees"	"Sounds too large a document"	"Don't know where I would access them from"

The 58% of participants that stated they would read a biodiversity strategy were further asked why, in an open-ended format (Table 12). Answers varied between participants. Wanting to know how to get involved was one of the most frequent answers, as well as wanting to be more informed on how management was occurring. The importance of being involved and engaging in the management of the environment was also mentioned.

Table 12: Open-ended survey answers on why participants would read a biodiversity strategy (from those that said they would). N=140.

Personal Interest	Staying Informed	Being Involved
"It's interesting and nice to have a greater level of understanding"	"I want to be knowledgeable and informed on what is happening locally"	"I'm curious whether there is something I can do as a student with no money"
"I am interested in how the local and national governments manage our environment"	"It is always better to be informed than not informed"	"I enjoy knowing what governments and other groups are planning on and how I can be involved in that"
"Why not! I want to see improved biodiversity and as such it's important to be knowledgeable about it and current tactics"	"I would like to know what's going on"	"In the chance that there is something small in there that I can do"
"I have an interest in what management strategies are being implemented in New Zealand"	"I am interested in learning about what strategies there are so I can make more fully informed opinions on the matter"	"Because I think it's important to be engaged in the management of our country, and one of the best ways to do this is through active participation in local and/or national politics"

The majority of young adults were not aware of local or national strategies adopted to take care of New Zealand's biodiversity and 46% of young adults believed that the New Zealand Government are doing a poor job at funding the conservation of natural environments, 36%

were neutral and 18% believed the government is doing a good job. This shows that despite young adults having a lack of knowledge about the general overarching planning strategies used to take care of native biodiversity in New Zealand, they still have poor perception of government environmental stewardship. This may be a perception adopted as a result of being removed from the formal planning process, where they are not engaging with these documents in a way that allows them to have sufficient knowledge around the working processes of these strategies and how they translate to action. It was also mentioned by key informants that young adults do not tend to submit on these documents either, as expressed by Key Informant DCC1:

"I think that is a weakness for council, we are poor with how we get submissions from the young people…like it's just an online platform…and it's on Facebook but you have to follow the Dunedin City Council to even see that…we could do better through encouraging more passive participation through submissions". (KIDCC1)

Key Informant DCC1 also mentioned *"we lack young people's involvement when it comes to that strategic level, and it comes down to whether people don't know they have the opportunity [to submit] or whether they just think they won't be making any difference, I just don't know"*. The formal planning processes is seen as inaccessible to young adults and input is not actively sought from this age group. In total 50% of young adults stated that they would definitely support council strategies if they knew about them, but the awareness is lacking because outreach methods are lacking. This was further shown when young adults were asked if they thought the young adults of today would take stronger environmental action or not, in comparison to current leaders. An overwhelming 97% of participants stated that that the young adults of today would take greater environmental action than current leaders.

5.5 Local agencies' environmental outreach: To young adults and the general community

It was identified above that young adults are largely unaware of formal planning strategies in regard to biodiversity management and also feel removed from the planning processes that they have the right to be involved in as citizens. This may result in a lack of faith that they have towards the central government in tackling biodiversity and environmental management as young adults are uncertain about how biodiversity strategies translate to on-the-ground action, and what their role can be in getting involved. Blake (1991) mentions 'lack of faith in agencies' as being a barrier to being involved. Young adults feel removed from the process and therefore

removed from the solution, despite the need for them to be a key part of biodiversity management in the future. In understanding the lack of awareness young adults have towards national and local planning strategies, it is important to look at the reasons for this and ways that young adults can be involved in the formal planning structure. This section discusses the outreach methods of council, DOC, community environmental groups and national groups directed at young adults and the general public in regard to environmental education, promotion of policies, volunteer recruiting, social media advertising and education, and general advertising of the planning process to the community.

5.5.1 Local and central government outreach: Promoting biodiversity management to young adults

Local government strategies are in place to link national-level biodiversity management plans to the local context, but are these plans reaching everybody in the community? In total, 36% of survey participants followed their local council on social media. Key Informant DCC1 stated that the Dunedin City Council's outreach tends to be mostly on the council website, and conservation volunteering Facebook page, and that sometimes they will reach out to the Social Impact Studio (University Volunteer Service) to directly target young adults, but this was usually to enlist volunteers. Planning strategies were not advertised on any social media or advertised as documents available to the public on the Council Website. Survey results found that young adults were largely unaware of where to find these documents. In contrast, Wild Dunedin (a community-run wildlife festival) made good use of their social media outreach and have dedicated members in their social media team. When asked how they had achieved an increase in community engagement in the festivals biodiversity-centred activities they stated *"We have a social media strategy now"* (KICG3). They found that engagement in the social media posts advertising wildlife events had increased from previous years with the majority of online engagement coming from families and students. From those following their local council, 68% of participants were still not aware of any local biodiversity strategies. This could be due to many factors including social media algorithms displaying more popular (pages with higher engagement) pages over council pages or lack of posting in regard to biodiversity management on the council's part.

5.5.2 Environmental education outreach by local and central environmental agencies

5.5.2.1 The importance of environmental education

Key Informants DCC1 (Dunedin City Council), G1 (government agency) and PG1 (penguin conservation group) noted the importance of educating the public on the environment to facilitate future learning and a connection with nature (Table 13). When asked about the importance education plays in connecting the public to environmental management schemes Key Informant DCC1 stated the following: *"DOC and DCC have similar visions and values about how people view the natural landscape, and the big thing is guardianship and that people are the guardians of the natural environment…if you have a healthy environment and you are connected to that environment you are a healthier person"* (KIDCC1). Key Informant DCC1 mentioned that community restoration of natural spaces relies on environmental education. In Dunedin, the majority of 18-25 year olds are made up of tertiary students, therefore the sense of 'community' is slightly different and the approach to educating them will also be different to that of a community group. This is because community groups tend to develop a sense of community through a shared 'sense of place'. Educating a community on biodiversity can then be more meaningful through linking it to a specific environment where they feel a shared sense of place (Asah et al., 2014; Sterling et al., 2017). For students coming to a new town, a sense of community surrounding physical environments may be lacking. Key Informant DCC1 mentioned that the Botanic Garden was an accessible, biodiverse, urban green space in Dunedin and a space highly used by students aged 18-25 years as a drinking spot. Key Informant DCC1 expressed they were aware that this age group, in general, did not know the importance of the Botanic Garden in regard to its biodiversity value and habitat cover. Key Informant DCC1 further expressed that if education outreach to this age group was enhanced, the Botanic Gardens may be a space that is better respected and valued for its nature values. If many young adults use the Botanic Gardens as a neighbourhood green space, being aware of its biodiversity value will help this group to develop direct experiences with nature and thus a greater chance of pro-environmental behaviours in taking care of it. Key Informant G1 and PG1 pointed out that their jobs in conservation had allowed them to form a deep understanding of urban biodiversity, and therefore to facilitate an understanding of biodiversity in the general public they need greater education to form an environmental ethic and stewardship.

Table 13: Quotes by Key Informants on the importance of environmental education

WHY is environmental education important?	
KIDCC1	"……one of the ways we help the community value and restore these spaces is through education about the values of native biodiversity and how they can contribute to the protection and enhancement."
KIDCC1	"The Council and DOC see education as an important step to get people to value biodiversity and the next is to take action and to take action you need to be educated."
KIDCC1	"…they [students] go there [botanic gardens] and drink but do they really know the importance of it – of pockets of native vegetation in urban space, so to educate them on the importance of that. Like they see it daily it would be awesome for them to see it as habitats."
KIG1	"It is really important [environmental education]. Part of wildlife response is to upskill the general populous, we are lucky to live here. We need to educate people, so they know what to do."
KIPG1	"Critical, crucial, all of those things [on the importance of environmental education]. Got to get it out there. We work in a bit of a bubble and we understand the issues, but you don't realise that it's not widespread knowledge."

Increasing the environmental education and engagement of community members through environmental agencies is important for growing trust between the community and environmental agencies, as a lack of it results in poor faith in their operations, such as the 46% of survey participants believing that the New Zealand Government is doing a poor job at funding the conservation of natural environments. Key Informant G1 (government agency) mentioned that poor faith in government biodiversity strategies and low education was a problem within urban populations. They established that urban populations tended to be more sceptical about government conservation initiatives, especially in terms of pest eradication, as urban populations are not as exposed to biodiversity education as rural groups (KIG1). It was further argued that there is an education gap surrounding the importance of urban biodiversity, as urban biodiversity is not held in the same regard to wilderness biodiversity by urban populations (KIG1). *"It is important the urban population know that trapping in your garden in town is just as important as trapping out by the Peninsula, people don't know that"* (KI10).

5.5.2.2 How environmental education is being presented to the public

Table 14 presents quotes from key informants who discussed how environmental education is currently being presented to the public. Key Informant CG2 (ecosanctuary volunteer coordinator) mentioned that their particular ecosanctuary had thousands of school-aged children coming through, and that it contributed to their funding. This biodiversity education programme at a Dunedin ecosanctuary was being facilitated through school and eco-sanctuary liaisons, and while there is no current programme in place specifically for young adults, KICG2 brought up that they did bring in tertiary groups from environmental subject-areas at times.

Key Informant DCC1 mentioned targeting environmental education at the 'young adult' age group during Orientation Week at the University of Otago through liaising with Halls of Residence and setting up 'active learning' experiences. Key Informant DCC1 revealed that the 'environmental learning' experience for some of the halls during Orientation Week of this year (2019) was set up as a garden walk 'back through time'. This is where the young adults were taught about the pre-human biodiversity of Dunedin, then the threats that biodiversity currently face and ended with an advisory session on what they could be doing to help. When asked how the DCC bridges the gap between education and action KIDCC1 stated *"it's a challenge for environmental groups…for us at the local level we need to balance that and provide education…saying things like this is the issue but this is how you can be a part of the solution"*. Thus, an important part of presenting environmental education to the public is informing and providing follow-up action steps. Key Informant PG1 (penguin conservation group) expressed that they would like to be doing more in terms of educating the public but that currently it was only through the website and occasional talks; funding cuts had resulted in staff cuts which has meant the conservation group were spread too thin to also take on an educational role.

Table 14: Quotes by Key Informants on how environmental education is being presented

HOW is education presented?	
KICG2	"… we have volunteers with our education department, and we have thousands of school aged children coming through every year… one of the main reasons we get funding is because of things like that, because of education [children's education]."
KIDCC1	"Active learning, yeah so like getting out and participating…there are environmental art initiatives, street art, support of community conservation groups. But there has to be a link to environmental education, which is really cool also because it's linking it back to the city." [talking about a fund for urban environmental education]
KIDCC1	"Over Orientation Week we get halls together and do the volunteer days. This year we shook up the focus on education rather than volunteering. We wanted to highlight urban nature so we based it in Woodhaugh Gardens, they "walked back in time" and went back pre-human settlement and then the threats and a call to action like what can you do."
KIPG1	"We have a limited brief at the moment to do that [public education]we do the occasional talk. We do have info on the website. Our office manager is always posting stuff to keep messages going out…We are doing stuff, but I'm not going to pretend its comprehensive no way."

5.5.2.3 Who is educating and who is being educated?

Key informants brought up many key views regarding the role of environmental education in a local setting and in whose hands it predominately falls into (Table 15). Key Informant SG1 (student volunteer group) questioned their responsibility to educate students on biodiversity issues. They identified that because they were an activist group it was not their primary responsibility, but at the same time recognised that educating students on biodiversity loss was

the way to get others on board to act (KISG1). Key Informant CG3 mentioned that students were a difficult group to educate and an especially hard group to target, especially through the Wild Dunedin Festival. Key Informant CG3 mentioned that children and families were easier to educate over the Wild Dunedin Festival Week, as already existing programmes from the Otago Museum and Orokonui Eco-sanctuary could be used, but that there were no current events or programmes directly for educating young adults in the student population. University subjects in environmental areas are the primary source for environmental education and education on biodiversity management for young adults who are students. For those young adults who are not students or who are not taking an environmental-based subject at university it is harder to access education on the state of the environment and thus it may be harder to involve this group in biodiversity management and pro-environmental behaviour through an 'education' route. However, there are other ways to increase public awareness of biodiversity and it involves strategic urban greening and increasing peoples' opportunities for direct nature experiences (Soga and Gaston, 2016).

Table 15: Quotes by Key Informants on who is educating and who is being educated

WHO is educating and WHO is being educated?	
KISG1	"We question how much it is our responsibility to educate…as a student activist group we feel like it's not our place…but at the same time the two things come hand in hand like if you don't know how will you do anything about it? So, to get people to do something about it you have to educate them. So, in a way it is our responsibility."
KIDCC1	"…schools can use town belt as an education platform. They were there for town belt boost to hear about what the different groups use it for and the biggest theme is protecting and enhancing its biodiversity and trying to break the stereotype that it's a dangerous space. It is actually lovely. So, I definitely think educating is really important".
KICG3	"Families are our key market because they want stuff to do during school holidays, and it's easy…because kids' stuff like education programs are already established…like the Otago Museum and Orokonui programmes. It's easy for them to just change it into a festival mindset. As far as students, we actually really struggle with that group."
KING1	"…we don't teach an environmental ethic in New Zealand, we have this myth that oh we are clean green New Zealand, but we don't teach good environmental behaviour. The teachers I deal with also don't feel confident enough to teach it. We don't teach teachers how to teach environmental ethic and we don't create it with kids."
KIG1	"…its awkward there is an education team, but we don't do traditional education. The view now is we are not educators. We do media. That's not to say there can't be other great education things in Dunedin…conservation week or Wild Dunedin are good platforms to get messages out around wildlife in our area…. Orokonui has a massive role to play in terms of education in this community."

Key informant interviewees from local and central government roles emphasised that government bodies did not consider themselves as having to take on the role of 'environmental educators' for the community (KIG1, KIDCC1). DOC's 'purpose' as shown on their website, is 'to work with others to increase the value of conservation for New Zealanders'. It is not

explicitly mentioned that DOC will be in charge of educating New Zealanders on the value of conservation and their natural environments (DOC, n.d.). Key Informant G1 (government agency) mentioned that DOC goes to other groups to carry out public education roles. A lot of young people also go through DOC-funded education projects that are led by other environmental groups, but there is no follow-up action after the young people had gone through the programmes. Therefore it is hard to know if their environmental education is effective in increasing young adults' awareness and perceptions of biodiversity. Environmental groups do not tend to have environmental learning outcomes; therefore, follow-up is not required, but may be helpful for future research.

Key Informant PG1 (penguin conservation group) mentioned the same thing, that education was not the main job of the conservation group. *"We have a limited brief to do that [education]…in the 1990s we had an education officer, but now we do not have the capacity to go and educate…we are doing stuff, but I am not going to pretend that it is comprehensive, no way"* (KIPG1). Key Informant PG1 stated that they have to put everything into conservation, as the last five years had been the worst for funding, meaning they have had to prioritise the conservation of penguins over education. They are also low in capacity due to staff numbers, and with limited staff, advocacy and education gets squeezed. Key Informant PG1 also mentioned that this lack of capacity shapes the way that they conduct their outreach to recruit volunteers, with no one in the team dedicated to finding volunteers despite emphasising the huge role volunteers play for the Trust. Key Informant CG1 (community group) had noted that the group of KIPG1 played a large role in biodiversity management in the Dunedin area but they are under-resourced and constrained and are increasingly asked to carry out more tasks by higher organisations. *"DOC have undergone a massive restructure in the last few years and they have gone from a hands-on conservation organisation to an organisation trying to offload some of their work onto private citizens and organisations and I don't know if that's a good thing"* (KICG1).

5.5.2.4 Bridging the education-action gap

In bridging the education-to-action barrier, the Wild Dunedin Festival have facilitated environmental groups around Dunedin to reach out into the community and have also facilitated public education on local wildlife (Table 16). Key Informant CG3 stated that it is much easier to organise activities for children as no specialist programme is needed. In facilitating the Wild Dunedin Festival, KICG3 pointed out that both the Otago Museum and

Orokonui Ecosanctuary were asked to provide some educational events, which was easy as they are already running events for young children. They further said that there would need to be more discussions around potential education opportunities for young adults and more specifically the student population, as there is currently no programme in place with any environmental group; *"For tertiary students, well we actually really struggle with that age group"*(KICG3). Key Informant CG3 emphasised that they simply facilitated the involvement of environmental groups around Dunedin in the festival and did not create any educational event from nothing. They also mentioned that they were able to obtain a festival grant from the Dunedin City Council (DCC) to hold the week-long event, however they said that the DCC viewed the fund differently to how Wild Dunedin viewed it *"…the way DCC looks at things is different to the way we do, often the metrics are different…we are about engaging the locals with surrounding nature and biodiversity whereas financially the city wants to bring people into the city…so we aren't targeting that market"* (KICG3). The Wild Dunedin funding pitch to the DCC focuses on engaging the community, *"as there is a lot of environmental benefits from the festival….it's the promotion of people to go out and understand their city"* (KICG3). *"The way we try to encourage education is through educating then having a follow up encouraging action post education…telling them they can go and make a change and things they can do to make that change"* (KICG3). Despite being a great facilitator for environmental education in Dunedin, Wild Dunedin is a one–week event and lacks long term capacity to continue their umbrella facilitation of events. When asked if they could do anything to increase young adults' education they stated that they would need a community group to come to them saying they want to run an event for educating students, and then they could think about organising something. However, thus far no groups had come forward to collaborate on initiatives aimed at young adults or the student population.

Table 16: Bridging the education – action gap

KIDCC1	"That's a bit of a challenge for environmental groups…[we should] provide education by saying -this is the issue, but this is how you can be part of the solution…there is a risk with pushing education and not following up with any call to action…volunteering is a really positive thing because you are providing a way that people can contribute."
KICG3	"…engagement is the first step to environmental action. And within the festival there are a lot of direct environmental benefits from the festival, but the majority of festival is entirely based on engagement…so the promotion of people to go out and understand their city. The whole idea is you educate and then there is follow up which encourages action past the education. So, there is no point going into a class and saying environment is in trouble, you need to say it's in trouble go home and do this. So, you are telling them they can go and make change and you telling them the things they can do to make that change."

With most groups mentioning that it was not their role to educate the public, the results on current education and outreach have shown that this is a major area needing consideration and funding at a local level. Many groups from national environmental management to student environmental volunteering and activism struggle with developing an education plan to target young adults. This raises the questions of who is left to educate the public on biodiversity loss and who informs the public on how they can help? As said by KICG3 and KIDCC1, ideally the public would have access to education on the state of biodiversity and a follow up that encourages further actions to be taken by providing further actions such as 'this is how you can help'.

5.6 Engagement strategies and action plans: taking the strategy from words to action

Any successful strategy for engagement "starts with the knowledge of who is being engaged and what they already know and do not know" (Novacek, 2008: p. 11572). Cullen et al. (2016: 52) reveal that "where public perceptions of nature run ahead of policy, the failure for policy makers to pick up on those issues will undermine confidence in environmental management and policy making". We are already seeing signs of misunderstanding where the public rated the state of biodiversity as being 'adequate' or 'good' despite the New Zealand Biodiversity Strategy and the Environment Aotearoa Report stating otherwise (Cullen et al., 2016). Peters et al. (2015) state that environmental agencies face a challenge to develop models of engagement that are sensitive to the diversity of community enviornmental groups. This is also true from resource management agencies to the general public. Engagement straegies and outreach methods must be sensitive to the diversity of the general public and cateter to different groups.

Ideally, there would be a local biodiversity strategy at the city level with goals of protecting and restoring urban biodiversity. Addressing each goal would be a series of objectives, including targets and performance indicators. An action plan would then detail how to achieve those targets in relation to the performance indicators. The action plan could be in the form of a physical document, such as one that could be picked up outside the council or downloaded online, with direct actions that people could take up in the home or in public to contribute to urban biodiversity management. Thus, they could read the action plan, and choose a community or individual action to be involved. Other actions could relate to increasing public

participation and enhancing volunteering opportunities which would be more appropriate for community environmental groups to work towards.

5.6.1 Establishing an action plan for community use

As stated previously, 42% of survey participants said they would not read a biodiversity plan. One survey participant mentioned the following *"Those sorts of documents [strategies] are often full of jargon and lack tangible applications".* This perception is true where strategies are badly written, however with good strategies including SMART (Specific, Material, Attainable, Realistic, Time-bound) action plans, the perceived tangibility may increase. Survey participants identified a strong support for the public being a part of nature management, with 99% of respondents stating that it was important for the community to be involved. Establishing a 'community action plan' (targeted towards community members who are seeking to engage) may help guide young adults into more meaningful involvement.

Survey participants were largely in support of more tangible application of policies to support on-the-ground action. For example, participants wanted to know exactly what was wrong, what to do, and how exactly to get involved. What this shows is that young adults' perceptions of how they would like biodiversity management to occur, is at odds with current policy. Cullen et al. (2016) established this as being a fundamental flaw in environmental management and undermines the groups confidence in future management, where managemnet is not understanding how this group wishes to be engaged. While most environmental issues cannot be fixed through a linear process of 'here is the problem and here is how to fix it", there are ways that local councils may be able to implement action documents at the community level that support council biodiversity strategies to help young adults stay more involved in the process through looking at how they wish to be involved. Thus, at the same time this group can gain a better understanding of the biodiversity management process in New Zealand.

5.6.2 Establishing a low-level action plan towards engaging the public and young adults

For local authorities and environmental groups, the process of engaging the community in environmental projects can sometimes be difficult. Through key informant interviews it was identified that local government and environmental groups tended not to have an action plan associated with the local biodiversity strategy that was specifically aimed at increasing the engagement of the public in projects, despite strategies often emphasising the importance of

'engaging with the public and enhancing public awareness' (Table 17). Having a plan to enhance community input into biodiversity management could include actions to increase volunteer avenues and actions to activate uninvolved groups. Key Informant G1 mentioned *"there really needs to be an engagement strategy"* at the local level. An engagement plan (targeted towards council) underneath local strategies would also be a beneficial addition to help identify actions to be taken when trying to engage certain groups within the community. For example, an engagement plan for young adults situated underneath a local environment strategy would give clear direction to how the local authority can better involve this group in environmental activities, how they can educate this group, how they can seek feedback from this group and how they can enhance the reach to this group in terms of formal environmental processes (such as encouraging submitting and voting).

Key informant DCC2 (Dunedin City Council), who worked on 'Te Ao Turoa: Dunedin's Environment Strategy', emphasised that the presence of an action plan would have been helpful underneath this strategy but that it was unlikely one would be put in place, as 'Te Ao Turoa' is an action plan in itself. It is placed too highly for specific community actions, rather it sets actions at a higher level under broader environment goals. An action plan would appear to be helpful not just for the education and outreach coordinators who seek to translate the policy into direct physical action, but also an action plan may be helpful to give tangible options to the general public on how they can help.

Key Informant G1 (government agency) also declared that an engagement strategy was needed, but they did not currently have one: *"We really do [need an engagement strategy] and we aren't good at doing that"*. Key Informant G1 further stated that there is an engagement plan with Predator-Free New Zealand 2050 but that it was on a national level around taking people from the couch to doing the same environmental management action as environmental enthusiasts. Key informant CG1 mentioned that councils and the Department of Conservation needed to remember that *"they are not just about governance, they are about operational management also and it's a big concern in New Zealand at the moment"*.

Table 17: The importance of engagement strategies

KIDCC2	"[The Dunedin City Environment Strategy say they wish to engage the public, is there an engagement strategy underneath this?] "No. My understanding is that…our Biodiversity Strategy could be seen as an action plan. Te Ao Turoa [Dunedin Environment Strategy] is higher level. Whatever we do has to be aligned with the Biodiversity Strategy."

KIDCC2	"That would've made my job a lot easier [the presence of an action plan]…I think it's unlikely [that an action plan will be made]. I guess it was intentional that the strategy be wrote out at a high level. When it comes to this, we are delivering existing commitments. Every strategy we have they have within their department lots of actions that they deliver."
KIG1	"There is no framework. In terms of out volunteering standard operating procedure. It's about "how do I develop the opportunity" it doesn't give advice around the delivery which is interesting."
KIG1	"It's a challenge with one ranger and 30 students, building social cohesion and letting them know what they are doing is important is hard. We need to be thinking about the delivery on the day and then like the follow up straight away."
KIG1	"Yeah we do [need an engagement strategy] and we aren't good at doing that. I mean certainly if you take predator free there is an engagement plan…but that's at a national level aimed at people on the couch. For crazy environmentalist people you have a completely different audience. We expect operations staff to do engagement planning as part of business planning."

5.7 Conclusion: biodiversity planning and young adults

The results have shown that there is a strong reliance on community groups in urban biodiversity planning, and the support of these groups is necessary. While the majority of young adults felt that it was local councils' responsibility to organise urban biodiversity management, a large proportion emphasised the importance of the an integrated approach of community, council and DOC. Key informants in environmental groups felt that community groups were largely fragmented and are not communicating with each other which makes it difficult to synchronise biodiversity efforts from national policy goals to on-the-ground action. The fragmentation between community groups makes it difficult for student environmental initiatives and volunteer services to engage young adults in community management projects. To try to better synchronise community biodiversity efforts with national biodiversity agendas, this research found that DOC considered implementing a top-down approach over community group efforts to sync the efforts with certain objectives. However, it was found that young adults have little faith in government management over the environment and believe that they are doing a poor job at managing biodiversity. Young adults were found to be largely uninvolved in formal planning avenues, which was noticed by key informants from local council.

Survey responses also show that some young adults have an interest in navigating these documents but do not know where to access them, and do not know what to do with the information. A lack of engagement with documents is not indicative of general apathy, as young adults show they are concerned about staying informed on the state of the environment

and are keen to be involved. However, the mode of delivery of planning they find alienating, as the policies are considered largely difficult to read or inaccessible or they are not aware of them in the first place. Connecting the dots between latent interest in biodiversity management and active engagement involves enhancing the channels of outreach to educate or advertise these strategies to the general public, especially as young adults have indicated they do not know where to find these documents. There is also a general perception among young adults that planning documents are hard to read and use a lot of planning jargon, which make them inaccessible to this age group. This perception deters a lot of young adults from reaching out and trying to find and read these documents. Participants suggested that strategies have companion documents that outline more tangible action for the public to take, such as an action plan.

Despite not knowing much about strategies, young adults felt that the government was doing a poor job of taking care of the natural environment, which may be a result of their disconnect from the planning process or a result of what they read in the media surrounding the poor state of the environment. Key Informant DCC1 stated that local governments really need to improve on how they reach out to young adults for submissions in the strategic planning process as they lack representation in submissions and environmental policy feedback. In terms of outreach to young adults, governmental environmental groups emphasised the important role environmental education plays in enhancing engagement and awareness of biodiversity issues. The organisation of Key Informant PG1 was not currently educating the public due to capacity issues including funding and staff numbers, and believed a lot of environmental education is being left to community groups and the local eco-sanctuary. It was established that the current education streams to the public are not enough and have a bureaucratic overlay that make it difficult to achieve successful active learning with the public, including extensive health and safety requirements that limit learning outcomes.

Overall it was found that environmental groups at the national and local level, government and community levels, tend not to have an engagement strategy or action plans that help direct the public to formal environmental planning processes or initiatives, which may be a reason for the notably homogenous trend of environmental volunteers (tending to be retired and environmental enthusiasts). Ideally these environmental groups would be undertaking actions outlined in the national biodiversity strategy to achieve defined objectives, and the engagement component would be one of those objectives, with a number of actions aligned to it. Despite this, young adults were enthusiastic about the idea of an action plan that may help them directly

make a difference, with many thinking that strategies may already include these types of direction.

6. Young adults and engagement in biodiversity management initiatives

This chapter examines young adult's current engagement patterns in biodiversity management, barriers to their involvement, motivators to being involved and opportunities to enhance their activation.

6.1 Introduction

The present chapter examines young adults' engagement trends in urban biodiversity management activities, barriers to activating this group to engage and opportunities to better engage this group. Specifically, this chapter addresses **Research Question 3**, which is **'In what ways and to what extent are young adults currently engaging with urban biodiversity?', and 'What are the barriers and the opportunities to better engaging them?'**. The structure of this chapter follows the structure of the research question: (1) exploring young adults' ways of engagement and the extent to their engagement; (2) an exploration of the barriers to young adults' engagement in initiatives; (3) the motivations of young adults to engage; and (4) opportunities to better engage young adults in biodiversity management. For the purpose of this research, exploring young adults' engagement in biodiversity management initiatives means exploring the ways and extent to which they participate in a meaningful service or activity in the form of pro-environmental behaviour to contribute to urban biodiversity management. The draft biodiversity strategy for 2020 mentions that a key to success with biodiversity management is through empowering communities to take action. Further stating that all New Zealanders should be empowered to be stewards of nature, conserving, managing and using it wisely (Department of Conservation, 2019).

6.2 Environmental volunteering trends in general

Local environmental groups are a vital part of community biodiversity management. Under the New Zealand Biodiversity Strategy all resource management agencies are tasked with supporting coordinated community actions contributing to the conservation of biodiversity (Peters et al., 2015). These groups or organisations, such as urban eco-sanctuaries, student environmental groups and community-based environmental groups, often play a key role in urban biodiversity management. In this study, 9 of 11 key informants were either members of an environmental group or facilitated environmental volunteering. In order to understand the way these groups worked, key informants were asked to discuss how their environmental group or volunteer agency runs on a day-to-day basis. Understanding how the groups run helps to build an understanding of the opportunities different population groups (such as students, or young adults more generally) have for getting involved in the group or agency. Overall, Key Informants CG2 (urban ecosanctuary) and SG2 (student volunteer group) mentioned how important volunteers were for contributing to urban environmental management (Table 18). Informant CG2 (community group) expressed the importance of recruiting volunteers to help with daily biodiversity management operations at the local eco-sanctuary. Key Informant DCC1 also expressed this in relation to the importance of facilitating volunteer action.

Table 18: Trends in environmental group engagement

KICG2	"…we have things like bird feeding which happens every day, we have baby kiwis in the top half of the eco-sanctuary, and they come here until they're strong enough to fight off a stoat which is like 1kg and then they leave. So we have a volunteer team dedicated to feeding them and we also have people checking the fence for holes, we have volunteers in the café, at reception, we have volunteers with our education department…"
KICG2	"…our operations team are – they are not really interested in having people come once so they would prefer the same people to come and learn the skills once then come multiple times to make it worthwhile."
KISG2	"…a good 70 % of what we do is working outdoors and that can be anything from working doing conservation, planting. So far, we have eco sourced seeds, planted along different streams and rivers to help with water quality and all that stuff, done a lot with native plants and reserves and wetlands, and so we do a lot of conservation based and environment-based volunteering and people love it, consistent we have students coming along to those things."
KISG1	"We engage in a whole range of environmental activities…from volunteering and planting trees to going out and doing weeding with other environmental groups. We have a garden. Also, because we are an activist group on campus one of our roles is pushing the university to be more sustainable and environmentally conscious."

6.2.1 Age of volunteers

Key Informant CG2 believed that volunteers were key to the daily running of their urban eco-sanctuary *"…there is like approximately 1000 volunteer hours a month, with Orokonui so it relies on volunteers, it wouldn't happen without them…we really strongly rely on them [volunteers] it's a very important part of I'd say most conservation projects in New Zealand."*. KIPG1 (penguin conservation group) also stated that without volunteers it would be difficult to carry out the yearly tasks, but KIPG1 did indicate that volunteers tended to be aged around 65 years and up, and mostly retired. It was a trend felt across community groups in Dunedin, as well as national conservation groups (KICG3, KICG2, KICG1, KING1). The absence of young adults as environmental volunteers for general biodiversity activities was a key finding. Volunteers tend to be older adults except for dedicated 'events' such as university halls of residence going out for a day of tree planting, or wetlands restoration. Peters et al. (2015) found that those in community environmental groups in New Zealand tend to be over 65 years old, which was also found in this research; Table 19 presents quotes by key informants in regard to volunteer age.

Table 19: Volunteer trends in general community: demographics

KICG2	"It is always the same groups coming through. There are similarities seems to be most of the volunteers are semi-retired or retired.
KICG1	"Community groups are ageing. It's a problem across the whole country, they have young volunteers that come and do a bit of planting every now and again, but most are 70 plus. I don't think young people discover the drive around environmental issues until they are a bit older. Some young people are happy to do some planting here and there".
KIPG1	"Our plant nursery makes use of volunteers on Wednesday, retired ladies usually. And occasionally guys but more retired woman 65+."
KIPG1	The penguin volunteers are usually retired people, retired Catlins farmers…Penguin transporters are usually retired because we need to be able to call them with short notice and say on a Monday night "hey can you come get this penguin tomorrow morning", for students that's just not going to work. Average age is 65+."

Peters et al. (2015) found that the largest proportion of volunteers (53.7%) in environmental community groups were aged between 51 and 65 years, with young adults between the ages of 19 and 30 years constituting only 4.7% of groups in New Zealand. Kollmuss and Agyeman (2002) reported that an individual is more likely to engage in pro-environmental behaviours if they have a direct experience with an environmental issue. Certainly, in Dunedin, the majority of the student population (made up of mostly young adults aged between 18-25 years live

within walking distance to the University of Otago, which is a heavily urbanised environment. Sterling et al. (2017) states that living in an urban environment can lead to a lack of access to environmental experiences that are vital to build strong nature connectedness and decreases the ability to have a direct experience with biodiversity. Key Informant PG1 noted that a lot of their retired volunteers had lived on farms their entire life and had experience in dense bush and fencing, thus their direct connectedness with nature would have increased their likelihood of experiencing biodiversity loss, thus are more likely to engage in actions to help. There are many other variables however that determine why young adults may not be volunteering in pro-environmental initiatives for urban biodiversity management at the same rate as that of retirees, such as time and transport, which are discussed in Section 6.4.2.

6.3 Engagement trends of young adults in urban biodiversity management

The main aim of this research is to explore young adults' levels of understanding of biodiversity in New Zealand, and their patterns of engagement in biodiversity initiatives, including the barriers and opportunities to getting them involved. Survey participants were asked how involved they perceived young adults to be in urban biodiversity management initiatives on a scale of 0 (being not at all involved) to 100 (being very involved). For participants the scale was a line from 'not very' to 'very' involved, and they had to pick a point on the line that they felt was representative. When processing these data, the points were translated to numbers. Participants most frequently picked the area on the line around 15-30, which is closer to 0 (not involved) than 100 (very involved). This shows that majority of participants believed young adults were not-so involved in urban biodiversity management initiatives (Figure 21).

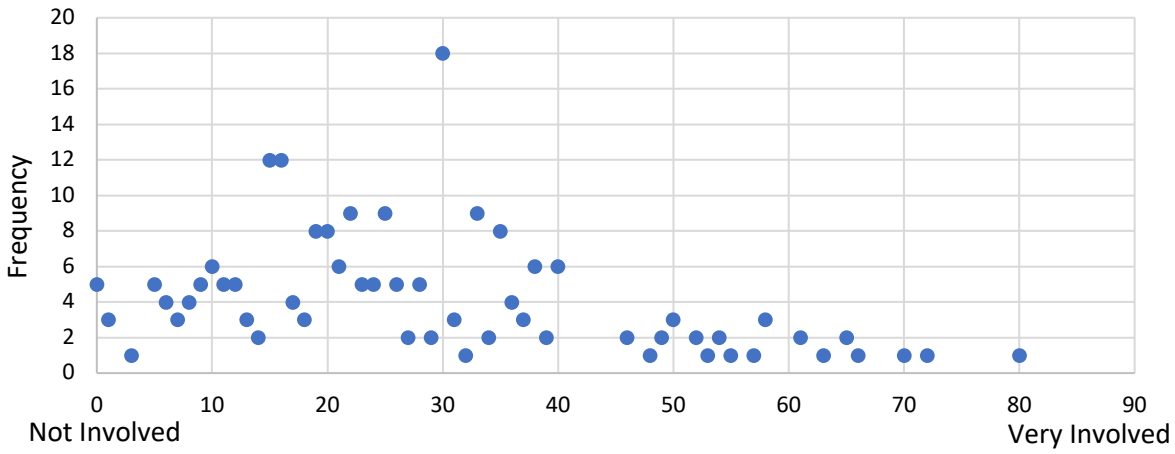

Figure 21: Survey participant (between the ages 18-25 years) perceptions of young adults' level of involvement in biodiversity management initiatives. N=233.

When key informants from student environmental groups were asked what their volunteering patterns looked like, SG1 (student environmental group) and SG2 (student volunteer group) mentioned there being a core group of individuals that would come frequently. SG1 (student environmental group) also added that those from environmental-based subject areas made up the majority of students in their group.

Table 20: Trends in young adults' volunteering

KISG2	"It's really interesting…what tends to happen is we have a core group of really keen beans who come out as much as possible…and they come out every week and second week…and then every project we have different faces…always different faces and different people."
KISG1	"Generally, it's the same people [volunteering]. But then we do have new people coming every now and then. We do have a core 10-15 people who show up to our meetings and like our social media posts."
KISG1	"We have lots of environmental management, geography, ecology students…they have an interest already."

Little to no research has looked at young adults' preferences with respect to pro-environmental behaviours. As part of the online survey, participants were asked what they would consider doing to increase biodiversity in their city of residency (Figure 22). In terms of overall trends, young adults selected that they would most likely be a part of activities such as picking up litter, reducing their waste, not using pesticides and planting native trees. They were most unsure about whether or not they would donate money to nature conservation groups. Survey participants were least likely to do actions such as keeping their cat inside or not own a cat, as well as trap for pests.

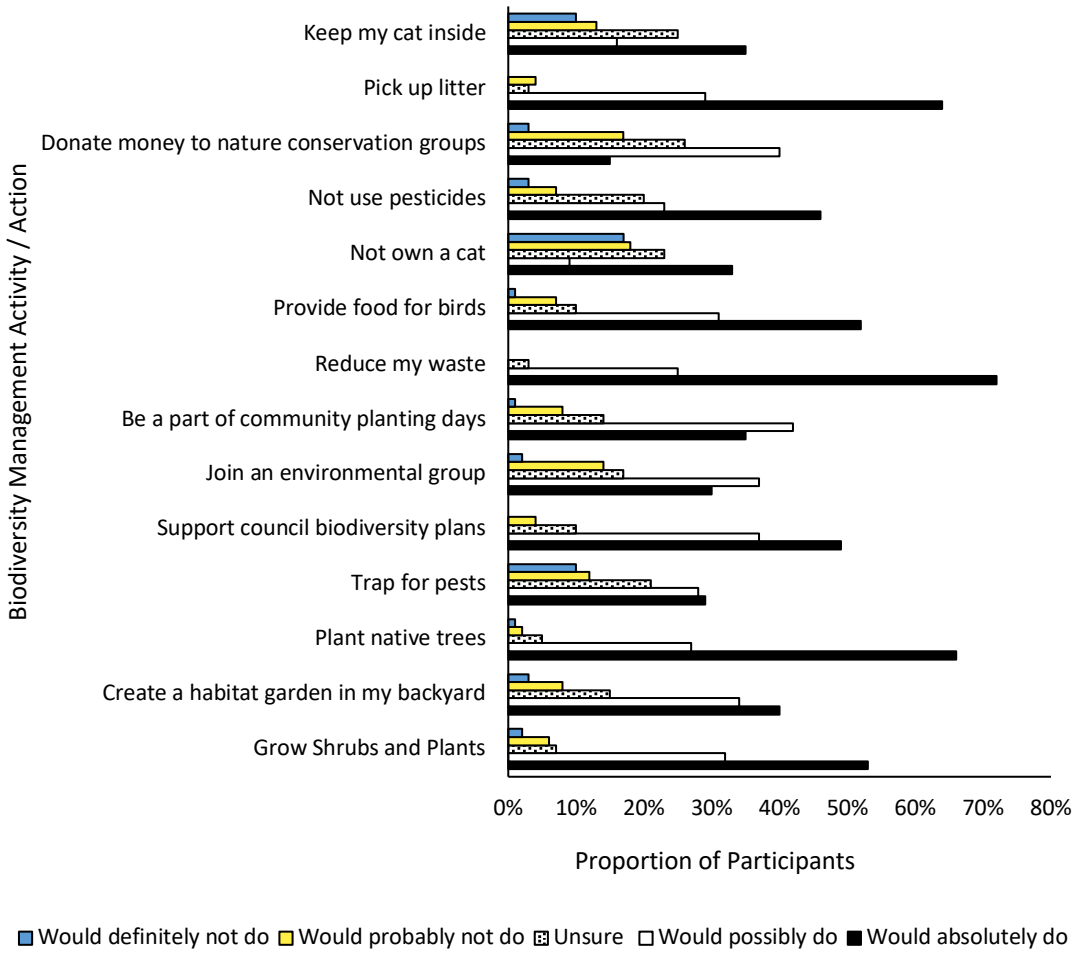

Figure 22: Survey participant (ages 18 to 25 years) responses to what they would consider doing to increase urban biodiversity. N=240.

The online survey contained an open-ended question asking participants what they currently do to support urban biodiversity management (if at all). Answers ranged from community planting days, picking up litter, studying environmental subjects at university and volunteering. Table 21 contains some of the answers.

Table 21: What do you do now to support urban biodiversity management? (open-ended question in the online survey)

What do you do now to support urban biodiversity management?	"Community planting / beach clean-ups, volunteering with community groups doing trapping and surveying, plant-based diet"
	"I pick up litter and have used native plants in my garden that are good for bees and birds"
	"I study ecology to deepen my understanding on the topic and pass my knowledge to others. I live a minimal waste lifestyle. Volunteer at Orokonui Ecosanctuary…"
	"Planting at our home farm"

	"Pick up litter, reduce my waste, use public transport, actively seek out beach clean-up groups to volunteer for, vegan diet to reduce carbon footprint"

From the open-ended answers on what participants did now to support urban biodiversity, the number of times each activity was mentioned was recorded (Figure 23). 'Picking up litter' and 'planting' were the most frequently mentioned. 'Volunteering' and 'reducing waste' were also mentioned frequently. Compared with the activities that they would consider doing, similar results were evident. Planting and picking up litter were very high on what they would do (Figure 22) compared with what they are currently doing (Figure 23).

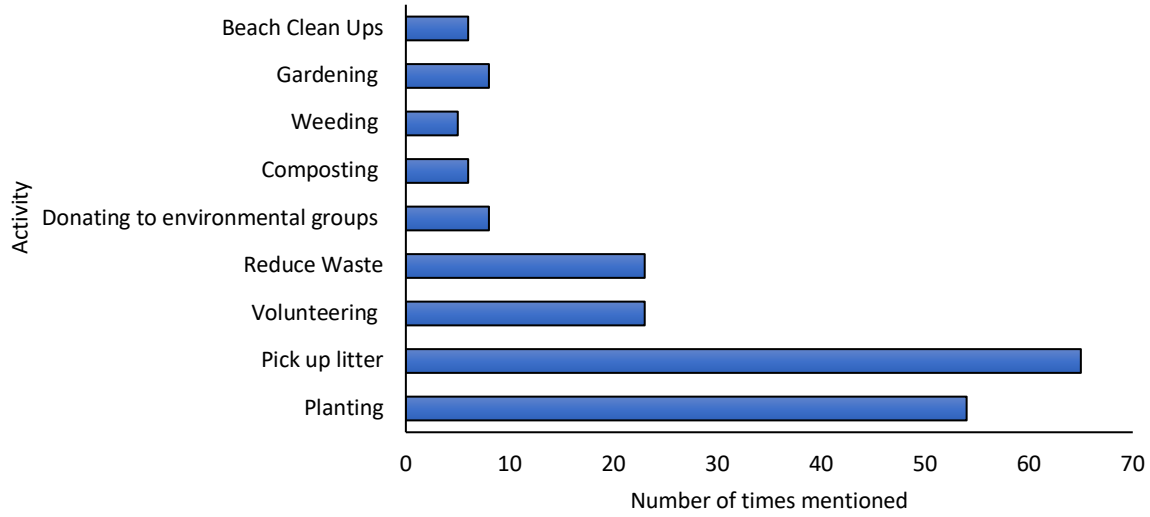

Figure 23: Frequency graph of the number of times a biodiversity management (that young adults are currently participating in) was mentioned.

6.3.1 Environmental groups

In the online survey, participants were asked if they were members of an environmental group. In total, 76% said they were not, and 24% said they were (N=241). As stated in section 6.2.1, Peters et al. (2015) had mentioned that of the community environmental groups they surveyed, those aged 19-30 years only made up only 4.7% of the groups. As within the study by Peters et al. (2015), online survey participants (aged 18-25 years) and key informants confirmed that there is a trend of young adults not being involved in environmental groups. For those that said they were not part of a group, a question was asked, probing for reasons for not joining (they were able to choose more than one answer). In total, 64% said they did not have enough time to be a part of a group. Fifty-five percent said that it was because they were not made aware of any groups in their area and 17% said they didn't have reliable transport. Participants were

further able to discuss other things that were stopping them from joining an environmental group through an open-ended question (Table 22). For those that said they were part of an environmental group, their reasons for joining are discussed in Section 6.3.3.

Table 22: What stops young adults from joining environmental groups

What is stopping you from joining an environmental group?	"Ad-hoc projects seem disjointed"
	"Often I think I should, but never get around to it"
	"I want to join at least one environmental group – no excuse except I am busy at work / lazy"
	"Would rather do something to contribute than gather around and just talk about it"
	"I have tried, and occasionally attend ones I can, but my university and work timetable create conflict"
	"I can get more done myself. Less talking more working"
	"It is not my priority"
	"I am not an environmentalist and only support conservation policies and actions insofar as they directly benefit the wellbeing of individual animals (regardless of their species etc)"
	"I do my own thing and am happy with my decision. I also try to teach friends and family about what and why I do things"
	"Too many old people"
	"Some differing beliefs make it hard to take part"
	"I do one-off events when I find out they are on instead"
	"Was in a group at university but now I am not at university and there is nothing out there"
	"They seem to be unrealistic in what they are trying to do"

6.3.2 How do environmental groups recruit young adult volunteers

Sixty-four percent of survey participants mentioned that they were not part of an environmental group because they did not have enough time and 55% said they had not been made aware of any. A lack of awareness of environmental groups in an area can come down to many factors including poor outreach strategies or specifically targeting certain groups in the population (such as environmental enthusiasts) while leaving out others. Key Informants CG2 and SG2 described how they recruited young adults to volunteer (Table 23). Key Informant CG2 said that they targeted environmental-based classes at the University of Otago when trying to engage young adults in environmental volunteering opportunities as they tend to be 'more interested' in engaging in physical pro-environmental action.

Table 23: How do young adults get 'recruited' to volunteer?

KICG2	"…The University [of Otago] uses the ecosanctuary as a venue sometimes and then there is a good relationship in terms of like people doing their research papers out here and that's like a relationship, we all want to keep going super strong."
KICG2	"I have been into the Department of Zoology at the Polytechnic and the Horticulture Department and I have just reached out to the department of botany in the hope that volunteers might be keen to get involved and we do often have ecology students and environmental management students reach out and say they would love to do some work. It's not for lack of interest, I know there are people interested and really keen"
KISG2	"We work like every other student club so, clubs are a big thing of what you do down here. Clubs days have thousands of people signing up to things."

Key informants from environmental groups mentioned struggling to involve young adults who are not environmentally inclined, in urban biodiversity management initiatives. Key Informants CG2, SG2 and G1 all reiterated the importance of engaging those who are not environmentally inclined, but expressed that the process of recruiting these people is difficult and there is little direction available (Table 24). However, Key Informant G1 (government agency) stated that it was more important to fix the pathways to engaging the ones that want to be involved first, and then to look into other groups of people who are not so willing to be involved. Enhancing the ability for people to engage in biodiversity initiatives or enhance biodiversity through their everyday actions will over time, by default, increase the engagement of those typically less environmentally inclined. As these pro-environmental behaviours for enhancing biodiversity in urban neighbourhoods will become normative behaviours. Thus if young adults with pro-environmental inclinations were given more direction into how to help in their everyday environment, other young adults in the neighbourhood (whether they have a pro-environmental disposition or not) will likely see this behaviour change and be more inclined to do the same.

Table 24: Reaching out to those who are not environmentally inclined

KICG2	"…my goal is to recruit people that would be keen to volunteer, you would go to the ones with a shared interest first and wait for everyone else if they are interested, they will seek you out."
KISG2	"When I talk to people who don't do anything with us but know of us they say "oh you do planting and beach clean-ups ae?" but the way they say it is like is that all you do? It's about communicating the sort of the reasons for what you're doing."
KICG1	"The zoo and geo students are driven [to engage] by career aspirations. But what we want is also those who aren't, why do we not get the ones not associated with zoo or ecology."
KIG1	"I honestly think there is enough people looking for volunteering in the conservation space that we don't need to change a lot of hearts and minds, we can

	provide for those that are currently knocking on the door. And there is another conversation about those who aren't even there yet. So, let's work with the willing to start with because we aren't catering for that properly yet"
KIG1	"there is how do you engage people that aren't engaged? And that's not just the volunteering team's conversation but it's also the education team's conversation. It's the media people's conversation so its multiple bits that need to feed into that which is yeah and ongoing challenge I guess."

6.3.3 What motivates young adults to engage in environmental action

For those that answered 'yes' to being part of an environmental group, the majority of respondents said they joined because they were environmental enthusiasts. Fourteen percent stated that it made them feel good to contribute to the greater good, and 11% stated they wanted to get out in nature, which made them feel good (Figure 24)*. Through the open-ended responses participants said that they were influenced to join by a number of things including 'all of the above', which were 'I am an environmental enthusiast', 'It makes me feel good that I am contributing to the greater good', 'It gets me out in nature which makes me feel good', 'it gets me out of the house and exploring my area', and 'I like to meet new people / like-minded people' (Table 25).

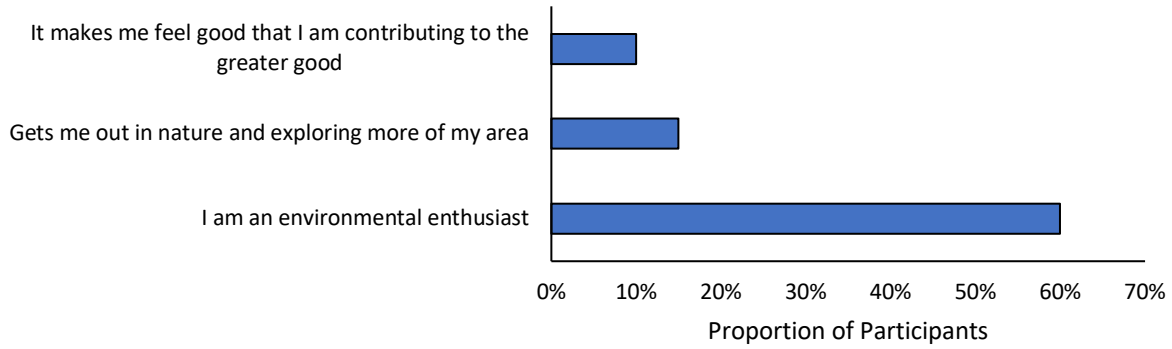

*Figure 24: Survey participant responses on what made them join an environmental group (for those applicable) N=65. *Only highest proportions shown on graph.*

Table 25: What makes young adults join environmental groups (open-ended answers from the online survey).

What made you join an environmental group?	"The climate and biodiversity crises. I can't stand by and just let them happen because I want the world to be liveable in the future"
	"Most of the above, mainly because I am an environmental enthusiast"
	"Local ecosystems need protecting from anthropogenic impacts, I'm doing my best to ensure they are protected"

When asked what would make them more likely to join an environmental group (participants could select more than one answer) the majority of respondents said 'the ability to do it with a group of friends'. Fourty-six per cent said they would like more proof that it actually makes a difference, 45% wanted definite opportunities to get up close with animals, 43% wanted an integration of an environmental activity with other activity like a social event or wildlife tour or wine and cheese event, 34% wanted more consistency in meeting times, 21% liked the idea of food provided, and 20% wanted vouchers or payment (Figure 25, Table 26).

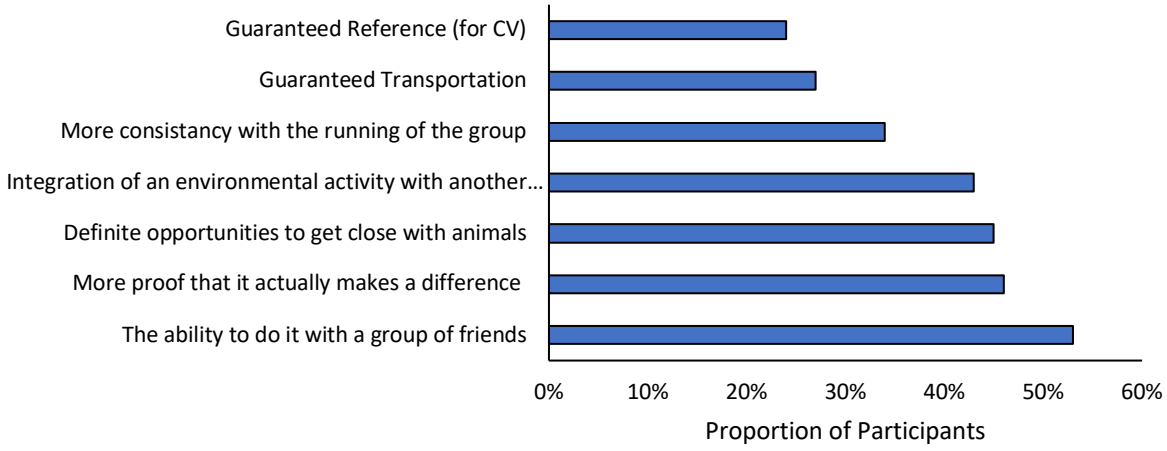

Figure 25: What would make young adults more likely to join an environmental group. N=239.

Table 26: Open-ended answers on what would make young adults more likely to join an environmental group.

What would make you more likely to join an environmental group?	"Meetings that are outside of usual commitment hours (e.g. 9-5)"
	"More education needs to be out there, also if the tools were supplied (such as spades etc.) that would be great"
	More advertising. Knowing people who go. Knowing what the group actually does"
	"Nice balance of actual service work and opportunities to also get to know who you work with outside of that. As well as a formal plan presented at meetings so an end goal is known or can be shown"
	"Times compatible with university schedules"
	"A group of like-minded people who are doing activities which are actually making a difference"
	"Having a welcoming environment. And more education. Like how contributions play a part in the bigger picture, because most groups seem very work-centric, i.e. Go to the site, get the job done, and okay thankyou bye…"
	"They need smart, realistic goals that will benefit the environment, not just plant trees and leave"

With 53% of survey participants choosing 'the ability to do it with a group of friends' as a top motivator to joining an environmental group, this research supports the theory presented by

Sterling et al. (2017) that people are more driven by social motivators. So in engaging those who are not environmentally inclined naturally, emphasising the social benefits of an experience may be key to encourage young adults to pursue an environmental-group experience. Sterling et al. (2017) found that the social benefits of conservation initiatives were a better motivating factor to volunteer, than purely joining an initative to help the state of the environment. When key informants from environmental groups were asked what they believed the biggest motivator was, Key Informants UOV, SG2, DCC1 and SG1 specified that social motivators and changing volunteering language surrounding the environment from purely 'getting in there and helping the environment' to 'let's get out there, help the environment and be a part of a social team' would potentially increase volunteer retention, either to the group or to an activity. However, Key Informant CG2 identified that not everyone was enticed by a more social experience, because some people join to get out into nature and spend time alone.

Table 27: Motivations for volunteering

KICG2	"The motivations are interesting for volunteers coming here. Like some want to come because they want to work in a team and they want to improve their skills, others want to spend time alone in the bush…"
KISG2	"… what comes through most of our volunteers that come every week is that desire to get out and do something constructive and positive in their community...you want people to do things for the right reasons like come out to make a difference, most do that. But a lot also they keep coming to do a bit of good and go outside but they come back because of the positive benefits for them."
KIUOV	"UniCrew is the key community of student volunteers who self-select to be part of this community and they're all from diverse year groups, backgrounds, home towns, but they all sign up because they want to be involved in something else that isn't their studies and when we run surveys the motivations are wanting to give back to the community, and wanting to gain relevant skills and experiences because they are in that transition phase in life I suppose."
KIUOV	"It is a good number of students coming in looking for opportunities to get out into the environment or working with animals. We see some differences like international students really want to get out and see nature."
KIDCC1	"You have to make it a bigger package. After the yoga event maybe 10 people signed up to come again because they liked the social things, and they loved pulling out the weeds. Some like the hard-physical work but there is not going to be one motivator everyone has different motivations."
KISG1	"It's a mix of showing others you care and self-gain, I am passionate about these things. It's nice feeling like you are doing something not just sitting and watching it happen."

Survey participants were asked to rank most appealing to least appealing environmental activity to get involved in, and the majority of participants voted 'working directly with feeding and rehabilitation of animals' as most appealing. Second was animal habitat construction, third

was neighbourhood tree planting, and fourth was stream restoration (Figure 26). The least appealing activities were ranked as environmental activism, trapping for pests, and track maintenance for eco-sanctuaries (Figure 27).

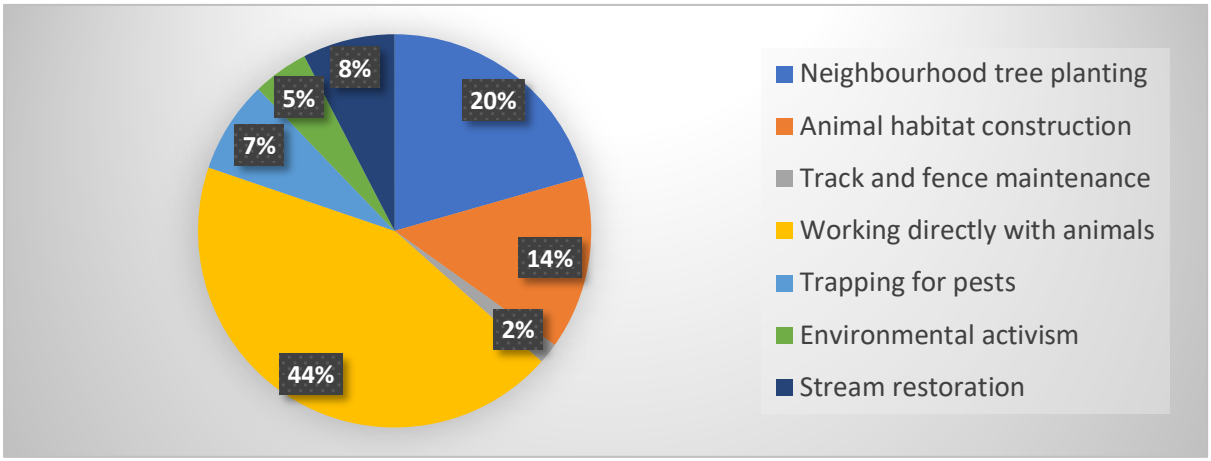

Figure 26: Survey responses showing young adults (aged 18-25 years) most preferred biodiversity management activity. N=241.

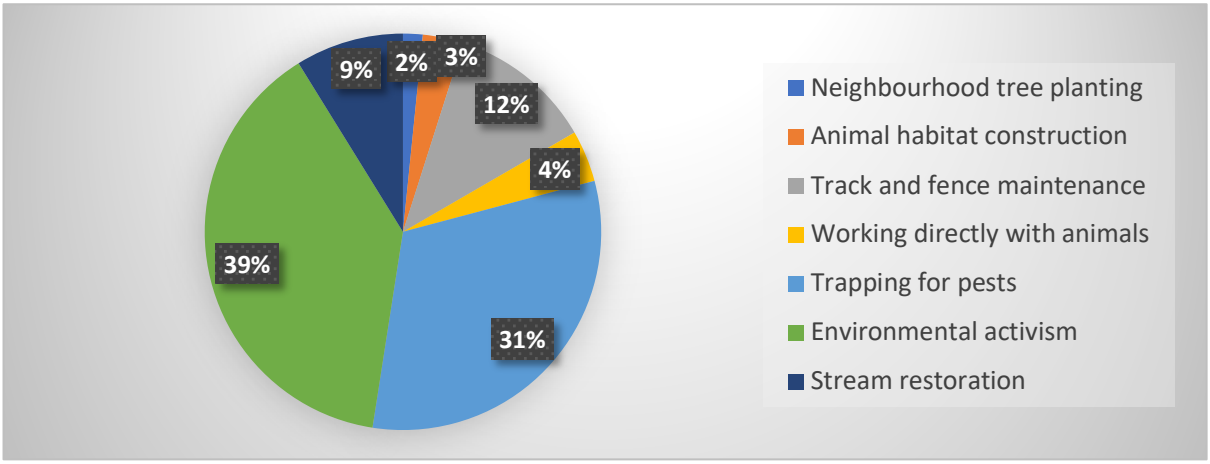

Figure 27: Survey responses showing young adults (aged 18-25 years) least preferred biodiversity management activity. N=241.

The most appealing and least appealing activities reflected results from questions asking survey participants to state what they currently did or what they would consider doing. Trapping for pests was consistently placed as something young adults currently did not do, did not want to do and was also one of the least appealing activities overall. This may be because they have more knowledge on what it actually involves, as young adults were shown to be aware of Predator-Free 2050. Having a heightened awareness of what each activity involves would allow young adults to make a more informed decision on what they would and would not like to be involved in. Working directly with animals has frequently been placed highly as a

desirable activity and something that would increase young adults' involvement in biodiversity initiatives if it was a promised activity. Animal habitat construction was also listed as a consistently desirable activity and one that respondents would consider doing, however it was not listed as one that young adults are currently involved in. Working with animals is a glorified concept, which has been amplified through DOC donation advertisements and media attention to projects between DOC and Air New Zealand or Fonterra. Especially as young adults tend to understand biodiversity in terms of discrete species (individual species), it is likely that young adults imagine working with animals as being projects with commonly advertised kiwi, kākāpō, kea, yellow-eyed penguins (Arbuthnott and Devoe, 2013). Young adults were most involved in minimising waste and planting, with tree planting in neighbourhoods also seen as a preferred biodiversity management activity. Minimising waste has been highly advertised as a way for people to do their bit for climate change, especially gaining popularity through the climate activism of 2019. There is no surprise then that young adults are taking this on board and engaging in this action, especially as reducing waste through using keep-cups and containers and recycling are becoming socially normative behaviours.

6.3.4 Characteristics of environmental group outreach to young adults

When survey participants were asked if they follow any environmental groups on social media 70% said 'yes' and 30% said 'no'. Social media makes local and international news more accessible to young adults, therefore this is typical of most young adults between the ages of 18-25 years. When asked who they followed (participants could select more than one) 83% followed their university on social media, 56% followed the Department of Conservation, 53% David Attenborough, 46% Jacinda Ardern, 36% their local council, and 22% the United Nations. The University of Otago has recently created a 'Sustainability at Otago' social media outlet to teach tertiary students how to be more sustainable in their everyday lives. It would be worth using university social media to spread awareness of local plans, submission dates, policies and environmental groups (both in the community and student groups) to encourage greater action. It may also be worth environmental groups revising their own social media strategies to enhance outreach to this age group. Table 28 displays key informant arguments regarding social media and its effectiveness as an outreach method to young adults. Key Informant UOV specifically mentioned that often social media was easier to use and quicker to advertise volunteer opportunities, than the software on their website.

Table 28: Getting people engaged: Social Media outreach

KICG2	"Heaps! [in terms of traffic via social media page]. It's another way I try to reach out to people. We have I think maybe like between 8 and 10 thousand followers and our posts are well loved and shared. Conservation posts people are supportive of. Whether it's the Dunedin community or the greater NZ community people just love it, doesn't take any work at all."
KISG2	"We will post on FB and Instagram saying this is coming up this weekend don't miss out, this is what we are doing, this is how you can benefit. For the larger events that's quite a concerted effort so that's Facebook marketing. Big events on Facebook, posts, heaps of promotions, we have heaps of posters that go up, big sandwich boards, and posters of people, and leading up to the event we will get other groups to share it and be very active."
KIUOV	"Marketing is a whole different board game and its really challenging to find the most effective route to students, so we do rely on social media a lot like Facebook groups to place volunteer roles, especially if some are timelier. It's not uncommon for us to have organisations reach out and say we have something this weekend can you find students, it's easier to put it on a Facebook page rather than our database because by the time you go through the administrative process that's over."
KICG3	"A lot of people in Dunedin are now recognising who we are [Wild Dunedin Festival] and went last year so they are coming back to do it again…so word of mouth. We also put more effort, time and money into advertising over the last two festivals. Like we have a social media strategy now, we have paid to have extra advertising in papers and in the radio, and that's really helped. We have taken on more people to help with social media."

Social media is not the only effective form of outreach to young adults, especially when trying to increase exposure of an environmental group or initiative. Many key informants said that they had multiple outreach avenues targeted to the general public and to students specifically. Table 29 presents some of the other ways Key Informants from community groups, student environmental groups and volunteer agencies are reaching out.

Table 29: Getting people engaged: Other outreach methods

KICG2	"I have dropped volunteer fliers into departments mentioned and I yeah I definitely want to do whatever I can to increase that relationship, so I have put up posters in those departments and dropped business cards off at the reception, but it needs to be something ongoing."
KICG2	"I read there is an event coming up with a market so – environment week at the university. So, it's something to toss up whether or not spending half a day in that environment to talk about the ecosanctuary and how people could get involved or half a day here and doing things would be more beneficial…unfortunately it's those barriers that stop be from investing that time because I feel like it won't get anywhere."
KICG2	"We already utilise the UniCrew website when we have specific things that people might like to do…"
KICG2	"We have newsletters for members, so they go out to membership which is about, under 1000 members. And we have a monthly shorter newsletter called birdcall that goes out to anyone, and it is digital. So, I think that that is for maybe the older

	groups of people that done necessarily use social media, or anybody, they are the two main ways."
KISG2	"We work like every other student club so, clubs are a big thing of what you do down here. Clubs days have thousands of people signing up to things."
KIUOV	"Orientation-week, stalls etc and word of mouth too, with students. They are the key ones. There is no magic bullet though."
KIDCC1	"We promote things on the DOC website, council website and a conservation volunteer Facebook page where that's all put up. And we reach out to student environmental clubs and yeah we go to student volunteer week with a stall. We try and have a mix of social media and face to face. I thought about talking to lecturers about opportunities, like zoology sends newsletters around."

In many cases student environmental groups (made up of predominately 18-25 year old's) and community environmental groups decide to work together on environmental initiatives (Table 30). There are many reasons for this, including increasing effectiveness of an environmental group, increasing volunteer numbers, or helping out the community. Key Informant SG1 (student environmental group) said that communication between community environmental groups and student groups fluctuates. Often a student environmental group will reach out to an environmental group in the community to collaborate on a project or ask if they need help with any upcoming environmental initiatives. If a community environmental group seeks the participation of students, they will often reach out to a student volunteer agency that then sets them up with a group or advertises the volunteer opportunity through their website.

Table 30: Characteristics of outreach between students to environmental groups

KISG2 Student Group	"…we do outreach towards the community because one of our biggest challenges post-quake is ensuring that different community groups that do work in the community know that we exist and are there to help them. Like going to networking events and environmental groups, talking at different community groups about what we do, how we do it, and ensure we do that outreach, so we continuously have people getting in touch with us and saying we need this many hands please help us out. So, there is a lot of that outreach of sharing our message, sharing what we are doing, so they know and reach out, so we have a constant stream of projects"
KISG2 Student Group	"..our collaboration with them [DOC] is a product of a lot of hard work on both sides to ensure that they understand our needs as students but we understand their needs as professionals and that's the tricky thing as a student group who does these things is building that trust, that two way relationship where they understand your needs and you understand their needs."
KISG2 Student Group	"Like you will be communicating with professionals with different spheres, need to make sure that you respond properly, that you understand their timelines, and if you have issues, we will advocate for you and talk to them and make sure they understand you too. It's very much a two-way thing, but hard to do for students as they tend to feel a big power balance like ooh scary adults that don't get you. Co-learning between the two groups. And collaboration is key."

KIUOV Student Volunteer Agency	"And then you have to think about, like for us, we can share the opportunity, but we don't necessarily have power over the experience that they [student volunteers] have once they go to an organization. Some are great and some organisations are really not great – they haven't put thought into how to craft an experience that would invite someone to want to come back. They are just more do the grunt work and go away and you are left feeling well I won't do that again. No introduction, no sharing of your story, no invitation to share, no cup of tea, these are actually big things. They make a difference. It's not always that they do it on purpose it tends to come down to capacity, I mean they are so under-resourced anyway they haven't got the luxury of time to think about how they can do that for volunteers and that's a reality but for us it's like what is our role to provide that feedback to organisations that host volunteer students?"
KISG1 Student Group	"We don't get much from UniCrew [volunteer service], we do the reaching out. Like for planting we initially reached out because we thought 'what is something that we can do that helps engage people at the beginning' and that's something I wanted the club to do more of because sometimes it's hard if there are no protests or anything it's like what can you actually do? You don't want to just sit around and talk about what you can do you actually want to be out there doing stuff…we reached out to heaps of community members and were kind of just like hey we are out here if you need anything and we have now built a relationship with those people. And we are planting again with [national environmental agency] in August so now they are coming and saying when are you coming out again?"

As Key Informant SG2 alluded to, young adults can sometimes feel a 'power imbalance' between student-led environmental groups and community environmental groups or national environmental agencies. Relationship-building between student-led environmental groups made up of predominately 18-25 year olds and community environmental groups is therefore difficult to navigate. Sometimes the differences between the two can cause conflict and relies on the building of trust over time, which is a concept discussed further in Section 6.4.3, which explores these relationship-building difficulties as a barrier to getting young adults engaged in environmental initiatives.

6.4 Barriers to young adults engaging in biodiversity management initiatives

To find out why young adults between the ages of 18 to 25 years were not engaging in biodiversity management initiatives to the same extent as retirees and older adults, barriers to their engagement were explored through the online survey and key informant interviews. A number of barriers came up in the research. These included practical barriers such as time and transport, personal barriers such as lack of awareness and mistrust in environmental agencies and institutional barriers such as lack of capacity and resources.

6.4.1 Barriers for environmental groups

6.4.1.1 Institutional Barriers

Through this research institutional barriers were identified as a large barrier to increasing the engagement levels of young adults in urban biodiversity management. Through key informant interviews with local councils, national environmental agencies and community environmental groups a few major institutional barriers were disclosed. As stated in Chapter 5, capacity and resources were low for many environmental groups, resulting in a lack of on-the-ground staff to facilitate public education and engagement strategies for different sectors of the community. It was established that for children, education strategies tended to already be in place through community-level workshops via museum education programmes or eco-sanctuaries, but no programmes were in place for young adults or the wider public. The poor capacity to create outreach strategies resulted from funding cuts and annual briefs that did not cover public outreach and engagement, despite many of these large-scale environmental organisations relying on volunteers and community aid to carry out biodiversity functions.

Table 31: Poor capacity of environmental groups and agencies as a barrier to engaging young adults

KIUOV	"It's not always that they do it [poor planning of environmental volunteer experiences] on purpose it tends to come down to capacity, I mean they are so under-resourced anyway they haven't got the luxury of time to think about how they can do that for volunteers and that's a reality…"
KIDCC1	"Yeah usually not [groups don't have enough resources]. So we try and create events with them to make it more interesting and they love that because they often can't but they are like if you can bring the labour sweet as."
KIG1	"Possibly that's an issue here [capacity of DOC]. There is a challenge for us around how do you change the mental model and say instead of me personally checking the beach, if I become a leader and create volunteer opportunities and get 20 volunteers, I am far more effective and can do 10 beaches as opposed to one… I just have so much work going on we would be more effective to use people that are willing and who have got skills to help with that. And people want to do it. People are constantly saying I want to do it."
KIG1	"…you need staff [to gather volunteers]. We tried to set up a programme last year of having a pool of volunteers…the problem is the concept works but we don't have the capacity to sustain that, we need a staff member to running the model or we have to outsource…there is a resourcing limitation there. And I don't know if that's truly thought about when you are developing a programme of work…"
KIPG1	"…We have been around since 1987 and in the last 5 years it's the worst it's been for funding…"
KIPG1	"…we have a general manager, full time ranger, and I do some field work to assist him, we had a Catlins ranger from October, and a contractor on Stuart

	Island. It's a lot for an NGO as in workload, but not enough staff to do everything. Advocacy stuff gets squeezed quite a lot."

6.4.1.2 Recruiting student volunteers

Key informants identified a number of other barriers stopping them from reaching out to young adults, or those in student environments groups. Key Informant CG2 (community group) identified that the consistently changing university timetables meant that their community environmental group did not tend to reach out to students as much as they would like. Key Informant UOV (volunteer agency) also inferred this, declaring that tertiary students want to be a part of initiatives but for many their schedules are too busy and do not work well around environmental initiatives. Key Informant CG2 also noted that it was too hard to host students due to the 'one-time' nature of student volunteers. It means that while a lot of resources are used to teach people how to help, they tend not to come again, which wastes time and resources having to teach new people again. *"…in terms of the operations team, they would prefer repeat visitors"* (KICG2). Key Informant PG1 (penguin conservation group) said that there was a skill shortage with respect to young adults and biodiversity management *"…some 20 year old students, they will show up and have never owned a pair of boots in their life or won't have a parka and come out to plant, they don't have a fleece or a parka or anything…We usually target people that we feel we need, so retired farmers are great for fences, technical skills are great"*. Key informants from environmental groups, expressed that the ideal volunteer candidates are those who are skilled individuals with flexible timetables and the ability to come back more than once. Young adults, especially those who are students, are often unable to commit long term and would prefer to join one-off initiatives (Seymour and Hacklay, 2017).

6.4.2 Barriers for young adults

Blake (1999) testifies that individual and social barriers can be a deterrent to pro-environmental behaviour. These sorts of barriers include feelings of not being able to change anything, a lack of trust in institutions, lack of time, lack of money and lack of information. This research found barriers to engagement that reflected the engagement model of Blake (1999). Blake's model shows the barriers between environmental concern and action (1999) (Figure 28).

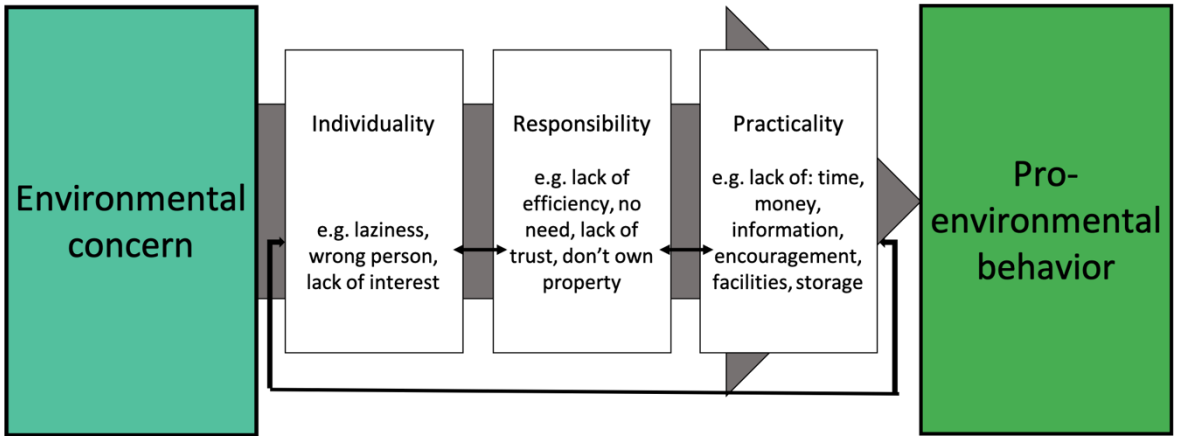

Figure 28: Model showing barriers between environmental concern and action (adapted from Blake, 1999).

Young adults who participated in the online survey expressed that the major barriers to them getting involved in environmental groups and initiatives were lack of awareness, lack of time, and lack of transport; Blake's (1999) model identifies these as mostly barriers of practicality. Other barriers include a lack of efficiency of environmental groups and lack of trust of these groups were found to deter young adults from engaging.

6.4.2.1 Time

Results from both key informant interviews and the online survey found that a lack of time and time clashes were the most prominent barriers to involving young adults in biodiversity management initiatives. Key Informants CG2 (community group), G1 (government agency), PG1 (penguin conservation group), SG2 (student volunteer group) and SG1 (student environmental group) all declared that initiatives run during week days were largely inaccessible to young adults who were students, and especially difficult for student environmental groups (made up of people from different subject areas) to navigate in order to be involved. Key Informants CG2 and PG1 said that most of their biodiversity restoration activities were conducted through the working week. *"...we don't want to work weekends because we have lives and families"* (KIPG1). Key Informant SG1 (student environmental group) said that weekend work would be more accessible for a lot of young adults, however understood that it was not really an option for local environmental groups. The consistently changing timetables were also stated as a barrier for young adults as it meant they were unable to be consistent with their volunteering (KICG2, SG1). Cullen et al. (2016) found that when people were asked for their reasons for not belonging to an environmental group, the most common response was that they could not commit the time (49%). Environmental groups tend to work during the weekdays, but students were more inclinced to engage in biodiversity

management activities in the weekends. Time and place are also interrelated, with KISG2 (a student volunteer group based in Christchurch) declaring that students (in Christchurch) were more likely to stay over holidays and weekends in the immediate area, but students in Dunedin for example were more likely to venture out of the region during holidays and sometimes weekends. There was no added reason as to why this was, other than that the Dunedin student body being largely comprised of students from outside Dunedin. Thus, holidays were more likely a time to explore the surrounding area, or go home, than stay in the immediate city.

6.4.2.2 Skills

Key Informant PG1 (penguin conservation group) noted that young adults tended to lack the same skills that may be found in an older, more experienced groups of volunteers. Key Informant PG1 tended to reach out to young adults that had come from farming backgrounds as they had the relevant skills needed to get the job done. This, again comes down to a trading of resources, where there is more pay-off using scarce resources to gain volunteers with skills as opposed to using resources to involve volunteers with absolutely no knowledge or skills in biodiversity management. Most young adults did not have the skills required for hands-on biodiversity management such as fencing, trapping and pesticide / herbicide, and chainsaw skills. To combat this issue there would need to be groups willing to teach these skills to young adults or student environmental groups. As addressed earlier, often community environmental groups and national groups do not have the capacity to teach young adults these skills or put them through extensive training programmes. Key Informant CG2, had mentioned that their operations team were reluctant to have student volunteers because of the same reason and that they were often unlikely to return, thus a waste of limited resources.

6.4.2.3 Lack of awareness

Awareness of environmental groups was low in young adults, and this contributes to their low levels of engagement in environmental initiatives (Table 32). In total 92% of participants said environmental groups needed to be more accessible (better advertised, cheaper or more organised). In another question (when asked why they were not part of a group) 55% of survey participants stated that they were not aware of any environmental groups in their area.

Table 32: Awareness of biodiversity groups / environmental groups

KICG2	"People don't even know we [Urban Ecosanctuary] are here."
KIUOV	"the grad opinion survey always says 'it would be great if there was more awareness out there and I would've started volunteering earlier'."

KISG1	"…one barrier is that people just don't know. About us, or they don't know what to do to get involved. Like they want to but don't know how or don't know how to keep in touch, where you meet etc…because we are a smaller group, we find it difficult because we have Facebook difficulties because we are smaller people don't see the Facebook posts because of the algorithm and we have an email list but who checks their emails. So that's the main thing."
KIG1	"Awareness is an issue."

A lack of awareness of how to get involved and where to get involved is a major barrier to getting young adults engaged in urban biodiversity management initiatives. The same barrier was found when looking at young adults' involvement in formal environmental planning processes. Young adults tend to want to be involved in environmental initiatives and in formal planning arrangements but are consistently left unaware of the opportunities to get involved. This leaves them feeling removed from many key pillars of community environmental management and a sense of meaningful engagement in the community. It is vital that young adults have the same opportunities to get involved in pro-environmental behaviours as any other urban resident.

6.4.3 Barriers creating conflict between environmental groups and young adults

Throughout this research key informants from student environmental groups, community groups and national environmental agencies acknowledged barriers that created tension between environmental groups and young adults or student environmental groups. Community groups mentioned inconsistency in students' availability along with a lack of commitment to initiatives, which have deterred community groups from wanting to further engage with this group. For some young adults it was identified that the environmental activities they had experienced with community groups had not met their expectations, and that was a view shared by a student volunteer agency (KIUOV).

Table 33: Barriers causing tension: Inconsistency and commitment

Inconsistency	"There are students that do want to be involved but they might be for a period of time and then they can't the next semester which is unfortunate as they are fit and a real asset for us to have here, so in a way I have kind of veered away from recruiting students or making Orokonui visible to students as a volunteering opportunity because of the barriers, like it just doesn't seem like the return as such, or amount of engagement would be worth the investment." KICG2
	"They [young adults] come once and we will never see them again." KIPG1
Lack of Commitment	"There are some situations that require commitment because of the training required like traplines, wildlife response to handle birds etc. Intensive training. So, if someone was to sign up and we train them and then they aren't able to commit it's not great for them and it's also not great because

	the ones who aren't trained can't do it. We had an info night laying out the expectations. If you can't commit you have to step out." KIDCC1
	"We have held two workshops for long term vision development. We invited youth council members and they wanted to come and accepted invitation but no show. We are reaching out and no one comes." KIDCC2
Expectations not being met	"…we don't necessarily have power over the experience that they [students] have once they go to an organization. Some are great and some organisations are really not great – they haven't put thought into how to craft an experience that would invite someone to want to come back. They are just more do the grunt work and go away and you are left feeling well I won't do that again. Like is it our role to provide that feedback to organisations that host volunteer students?" KIUOV
	"…we want to make sure it's a work thing, its genuine work and they may or may not experience things they are expecting. International students want to come for the views and stuff but if they are coming with that expectation it's just not going to work out for us." KIPG1

6.5 Opportunities to enhance engagement of young adults in biodiversity management

In general, while introducing incentives could shift decision-making towards valuing biodiversity, it would also flip the cost-bearing nature of biodiversity management actvities into activities that benefit the individuals and groups carrying out the activities (Buta et al., 2014). Sterling et al. (2017) claim that the effectiveness of environmental management projects can be enhanced by identifying significant predictors or motivations for participation and capitalising on these motivations. Through this research the main motivators for young adults engaging in biodiversity initatives were discovered and the barriers were identified, this chapter explores how both can be assessed to increase young adults' involvement in urban biodiversity management. Key informants from community groups, environmental groups and national groups discussed opportunities they could tap into to increase the engagement of young adults in urban biodiversity management. Some are ways they are already doing so and some are things they would consider doing to help (Table 34). Opportunities such as creating student packages to allow young adults to volunteer with friends, increased collaboration between the university and community, tangible conservation outcomes to increase awareness of how small things are contributing in the bigger picture, and relationship-building between volunteers and groups to increase volunteer retention, were all points of discussion.

Table 34: Opportunities to increase engagement of young adults

KICG2	"I would be keen to create a student package or students wanting to come to help with friends, but I need to figure out tasks they can do without prior experience….it's just creating something we can do with little staff engagement that people can just sign up and do it."
KIUOV	"In the short term I want to see more collaboration with a bunch of groups across the university and community, global collaborations…"
KIDCC2	"Forest and Bird Youth…it's a more fluid and flexible model if they want to take action. They come together first and then come to us, it can be issue based, skill based, area based, as long as the work they do is around helping nature."
KICG1	"This is where the 'trees that count' thing has been really interesting…you go on website and register trees and it shows you how much carbon you've been offsetting through your planting. And so, you've got some cool stats. And people can link it to something much bigger. Facts and figures are nice. Just saying "it's good for biodiversity" isn't tangible, people want tangible! Saying x amount of birds will come back etc. Everyone wants instant gratification, instant, we are all used to social media where we can share emotions immediately and people respond quickly. Taking something instant to conservation is something to think about, the whole gratification side of things."
KIPG1	"We could do better with volunteers actually, at the moment we are very reactive. It's kind of just how things role. I think equally we want to offer something back to volunteers, so we want to try, especially offer experiences that are worthwhile and give them a bit of background to what we are doing and upskill them in basic weed control etc. we haven't got to the stage of offering training yet. It would be hard to find folks when you need them for the right skills."
KIPG1	"Yeah, we always cover that [an intro at the start of volunteer activities], sometimes more ad hoc depending on how big the group is. With workplan pressures we have to stay in touch with what other groups are doing. We often celebrate with volunteers with a BBQ or coffee and cake to acknowledge them and build that relationship."

Nisbett and Strzelecka (2017) elaborate on regulatory focus theory by stating that when using persuasive messages to encourage people to engage in environmental action the state of mind of the participant is important to understand. People can either be prevention-focused or promotion-focused. Prevention-focused individuals prefer to think about goals in a loss or non-loss mindset, thus in regard to considering engaging in environmental behaviour the person will consider whether or not the experience will result in a loss for them or lose nothing. For those in this mindset, when considering being involved in a biodiversity management initative such as planting, they may consider the distance it takes to get there, the time out of their day and they may consider cost. For example, if a planting day is located in a place that costs the individual money and time to take public transport, they may be less inclined to join. Whereas if the planting initative had a free shuttle that picked up individuals from outside their home and back at a set time, this might be more inviting. Those in a promotion-focused mindset will consider engaging in environmental activities through a gain or non-gain mindset, considering

whether or not they can personally gain anything out of the experience or not at all, and for those individuals it is important that the volunteering language used is one that promotes social benefits as well as health benefits of the biodiversity management activity, without emphasising solely on the environmental benefits (Nisbett and Strzelecka, 2017). It may be nessesary for further research to look into regulatory focus theory, young adults and environmental management volunteering to get a better grasp of opportunities to cater the volunteer experiences to this age group.

6.5.1 Opportunities to overcome the barriers

Key informants were not explicitly asked how they could overcome certain barriers to young adults' engagement, but many mentioned things they were doing to actively increase the ability for young adults to engage in their initiatives. Young adults that had participated in the online survey had identified that they were more likely to be part of an initiative if they could do it with a group of friends. Key Informant CG2 said that if a group had signed up they would try to fit them in, despite it not being a goal of theirs to have groups coming. Key Informant DCC1 understood that people tend to feel more comfortable joining things with people that they already know and were therefore supportive of pushing the social side of volunteering, especially with young adults encouraging groups of friends to do activities together.

In regard to overcoming the time barriers, Key Informant DCC1 explained that they often tried to create volunteering opportunities on weekends to account for the student population, and in most instances, if people sign up to volunteer with the Dunedin City Council, they would ask further questions about most available days for the students to try and find opportunities catering to them. Key Informant DCC1 also discussed a 'no-commitment' policy as being vital when signing up young adults to the volunteering group, explaining that as long as they know they are still on the mailing list and still getting exposed to opportunities that is most important. KIDCC1 further expressed that it was better for students to not feel like they have to make a full-on commitment as that acts as a deterrent. Key Informant NG1 also supported the idea of expressing the non-committal nature of signing up to groups, given that young adults tend to have varied schedules over the course of a year, *"…we are careful with them [students] during university and then ask over summer if they have more time to contribute more but never to feel indebted and it takes the weight off them because people want to be involved but are worried about the time."* (KING1). When asked what they would most likely be interested in, comparing joining an environmental group or joining up to a system that notified when there

are environmental activities going on, 79% preferred the option of being notified rather than the 21% who would prefer to be part of a group. This was something that was discussed with key informants, with the majority stating they would rather volunteers were signed up to something more non-committal in nature.

Transport, and thus access to environmental initiatives, was another barrier for young adults to get involved in environmental initiatives. Key Informant SG2 (student volunteer group) said that they provided transport to and from big environmental events through working with local bus companies. For smaller environmental initiatives KISG2 mentioned that they had secured access with University of Canterbury fleets. Key Informant DCC1 also mentioned trying to ensure transport was covered, subsidised or at least organised through the university. Key Informant DCC1 expressed that ensuring there are walkable options throughout the year is of great importance to counter this issue.

6.5.2 Emphasising the 'WHY' to increase volunteer retention

One of the most significant findings of this research is the identification of ways to enhance and encourage young adults' engagement in biodiversity management initiatives with respect to the 'volunteering language used' in activating this group. Young adults wanted to know the 'why' of initiatives, being the purpose of the biodiversity management initiative and how it actually helps to improve the state of the environment. Young adults felt discouraged from participating in an environmental management initiative if they did not understand the bigger picture of how it was actually contributing to the state of the environment. Having a tangible outcome of an activity was desired. Therefore, improving the language around 'the why' of environmental activities is of utmost importance for environmental groups to adopt if they wished to gain young adult volunteers. Key Informants SG1 (student environmental group), SG2 (student volunteer group), UOV (student volunteer organisation), DCC1 (Dunedin City Council), CG3 (community group) and G1 (government agency) all highlighted the change needed around volunteering from the 'get on and do it' attitude to one that emphasises the bigger picture and reasoning behind the environmental activity. Key Informant UOV said that the university volunteer centre (UniCrew) had recently changed its name to the Social Impact Studio. The name change was decided upon through discussions on the purpose of the centre, in that volunteering was not the end goal, instead they realised that social impact was the end goal of most young adults wanting to go through the centre. Therefore, the language change surrounding the centre was appropriate.

For conservation organisations and environmental groups, the same kind of language change is slowly being adopted. Asah et al. (2014) stated that managers of environmental initiatives should tap into people's motivations and think outside of just the environmental benefit of an activity; rather it should be clearly articulated all of the social and cultural benefits one may gain from engaging in an environmental initiative. By using this method of developing environmental initiatives that match both the motivations of participants and their desired engagement level, Seymour and Haklay (2017) argue that this will also influence more long term contribution rather than one-off participation. Key Informant DCC1 emphasises this; *"For promoting an environmental activity, the biggest seller is actually that social connection. Like it's a chance to meet like-minded people, go somewhere new and have a good time and its good for your mental being. And the second benefit is – and we are going to stop the spread of weeds and predators and help the environment.".* Table 35 contains key informant quotes on the importance of emphasising 'the why' in volunteer conservation initiatives.

Table 35: Overcoming Barriers: The Why: Volunteer Language to increase engagement

KISG2	"…so what we do with a project/activity, is we get the project person from the organisation to share their mission, the 'why', rather than us sort of just spitting it out blandly they share their passion and reason they are organising the volunteers, the volunteers take that away and hear it naturally, and so they aren't just turning up and doing it then leaving. And we always put on a morning tea and stuff and stand there with the people leading it and they share stories"
KISG2	"The communication of 'the why' of the things we do its trickier, we have put a lot of thought into the story. Especially for larger events like big give last year in O-Week was in Godly Head which is an old World War II site in Christchurch where they had garden placements and that area got damaged after the quakes and it's been left there. So, it was how you communicate the story. So, when we do big events, we really have to share the why publicly to get more people. We do pick and choose what we do to ensure there is a story there. New Brighton is close to Christchurch people's hearts and it needs a lot of love and work, we picked a place that really needed help and had a story that matters."
KISG2	"Its hard. But it is so important." [on getting the message across that the work is meaningful]
KIUOV	"…we have been really trying to lead with our 'why' this year, hence the shift from volunteer centre to student impact centre, volunteering isn't our end game, its not that we want every student to volunteer and that's it. Why do we want students to volunteer, well it's the social impact we can achieve, the environmental impact we can achieve for our communities, it just makes more sense that way. That's been a significant shift in the way we do things, the conversations we have with students and organisation we wonder if there is a different way to connect with students, and there is we just haven't thought of that yet."
KIUOV	"Language behind volunteering is so important."
KIDCC1	"You have to [emphasise the why] when we do our programmes we spend time justifying why we are doing it and what are the benefits going to be."

KIDCC1	"Its hard with the older conservation groups, they are very much labour focused, and you actually should be selling it as an experience. What can we sell as an experience, what are the views like, can they go for a picnic? You have to make it a bigger package."
KICG3	"…the way we do planting activities is fundamentally boring. Like people show up and its just like here are some gloves, go pull the grass out. I don't think people should go away from a planting event with having just planted trees. There is an opportunity to start with, they should know the names of them and be able to talk about them and have fun and that's just not how we do things. People just turn up and plant trees and that's it. No wonder people find it boring because they just don't understand the WHY. Like why would I plant this tree? They need to know, 'oh because it grows this berry that feeds this bird, they need to know the bigger picture'."
KISG1	"…we don't have any strategy to spread awareness of the meaningfulness of our activities. Change happens it's just slower. But it is hard to communicate that."
KIG1	"It's a challenge with one ranger and 30 students, building social cohesion and letting them know what they are doing is important is hard. We need to be thinking about the delivery on the day and then like the follow up."

6.5.3 Using a mobile application (app) or online platform to increase engagement

When asked if they would support the development of an urban biodiversity strategy or app that helps connect people to environmental groups or activities in the area, 96% said 'yes', and 4% said 'no'. The creation of a central volunteering platform where environmental groups, government bodies, student groups and local councils can reach out to volunteers for one-off activities or short-term projects was seen as ideal for both the young adults who participated in the survey and for many key informants (Table 36). Key Informants G1 and UOV both said that it would be helpful to have a platform where volunteers can advertise themselves, as well as groups being able to advertise activities. Being able to showcase the applicable skills you have as a young volunteer would not only help community environmental groups to direct volunteers to where their skill sets can be best used, but would also help these young adults become connected to initiatives. Key Informant DCC1 said that a mobile app can also be a central point for citizen science, so that people could also passively contribute to urban biodiversity management through activities such as counting birds or listing what species of plants and animals you are noticing in the city. Key Informant PG1 noted that their organisation would not benefit from an app as they operate much more reactively than a typical environmental group. Which means they do not tend to have much notice before they have to do tasks involving volunteers.

Table 36: Key informants in support of an app or online platform to increase engagement

KICG2	"Would love to be part of an app!"
KIUOV	"Yes an app is ideal [it would be nice to] put in your preferences so the opportunities that pop up are aligned to that. And you could also set when you would want to volunteer, like Thursday evening etc. There are a number of different platforms out there."
KIDCC1	"Yes, I would love to know more about that [a central app]. If we could push an app over Facebook as it would be more central, it would be so good. And there could be stuff they can do on the app, like passive citizen science that they can contribute to."
KISG1	"That would be cool… there would be interest to have a way to bring everyone together. If you could bring them [environmental groups] together it would be easier to get people involved. You can keep updated."
KIG1	"…this 'app might be the way to present that and then there is some ideas around giving people gold stars effectively to say they are amazing volunteers and they could get CV and references and then also if you are the community group organising it you can have gold standards of amazing delivery of opportunities and you're endorsed by the department or WWF if you have done something and it lifts people's confidence in you. There's a lot of exploring that can be done there."
KIPG1	"Yeah it could help [an app]. But we are a bit too reactive. if I was more organised that would be great! It must drive the Social Impact Studio (at Uni) crazy that we can't ask in advance, we always are too quick. That puts it nicely we value volunteers and want to celebrate that commitment. And we understand the value this type of work has for lighting a spark in young people, maybe it will change their understanding of ecology and change the line of work they want to do and so forth."

6.6 Conclusion

This research adds to existing literature on biodiversity volunteering, and confirms through interviews with key informants that the average age of environmental volunteers is around 65 years and up. It found that there was an absence of young adults in environmental volunteering. Young adults perceive their contemporaries as being largely uninvolved in biodiversity management activities which reflects the results on engagement. It was found that student environmental groups tended to have a core set of young adults that would come frequently, but for the most part people would come once and not again. It could be the lack of retention in the volunteering or lack of commitment to groups that are causing the low numbers of young adult volunteers. The students that were part of environmental groups at university tended to be from environmental subject backgrounds like geography, ecology and zoology, with little from non-environmental subject backgrounds.

Little-to-no research has looked at young adults' preferences in regard to pro-environmental activities. This study has contributed to filling this gap, finding that young adults were most likely to engage in activities such as native planting, waste reduction and picking up litter. Young adults were least likely to keep their cats inside, not own a cat, and trap introduced pest species. This research also found that for those who are environmentally inclined and currently active in biodiversity management, they were mostly engaging in planting and picking up litter. Reflecting the preferences of what they were most likely to do.

In regard to participation in environmental groups, this research found that the majority of young adults were not part of an environmental group. Mostly because they did not have enough time and they were not made aware of any groups in their area. The lack of awareness was found to have stemmed from poor outreach strategies towards young adults. Other reasons for not being part of an environmental group included poor perception of environmental groups and lack of faith in how they are actually contributing to biodiversity management (scepticism). The majority of young adults were found to follow environmental groups on multiple social media platforms, and around a quarter followed their local council and over half followed the Department of Conservation. It provides a good base for groups to reach out to young adults through social media, but social media outreach to this age group was found to be poor. Contributing to the lack of awareness of biodiversity strategies, groups and initiatives.

In terms of young adults' motivations to engage, this research found that the majority of young adults engaging in biodiversity management activities did so because they were environmental enthusiasts. Others stated it made them feel good to contribute to the greater good. It was also found that young adults would feel more motivated to join an environmental initiative if they had the ability to do so with a group of friends, and if they were provided with more proof that the work would actually make a difference. The activities that were most appealing to them to engage in with a group were planting and working directly with animals, the least appealing were environmental activism and pest species trapping.

6.6.1 Conclusion on barriers to engagement

This research found a number of barriers to engaging young adults in urban biodiversity management activities. These were split into barriers faced by institutions and barriers faced by young adults. This research found that for environmental groups, low capacity and lack of resources were the leading barriers to engaging young adults. The low capacity resulted in poor

ability to create ongoing outreach strategies and fund engagement officer roles. Environmental groups with low resources are particularly careful with how they use them; it was noted that a lot of resources are used training volunteers, and when they cannot commit long term it ends up wasting scarce time and resources.

For young adults, barriers of individuality, responsibility and practicality were found, reflecting Blake's (1999) model of pro-environmental behaviour. Young adults were deterred from engaging in initiatives due to feeling like it doesn't make a difference, lack of trust in institutions, lack of time, lack of money, lack of skills and lack of awareness. Time was the biggest barrier; most biodiversity management activities were found to be conducted on weekdays when young adults were most likely to be busy. Consistently changing timetables for young adults in tertiary education was found to be a time barrier, meaning they often could not commit to long-term volunteering. It was also found that young adults tended not to have sufficient skill sets to volunteer in biodiversity management. This research also found that young adults had a strong lack of awareness of environmental incentives, with the majority of young adults stating that they were not aware of any groups in their area and felt they needed to be more accessible. Some barriers were also found to cause conflict between environmental groups and young adults. Inconsistency in availability and lack of commitment for long term volunteering left environmental groups not wanting to engage with this group if they were low on resources. For some young adults, environmental initiatives did not meet their expectations and they felt unvalued in the work, which reduced their likelihood of returning.

6.6.2 Conclusion on opportunities to enhance engagement

Capitalising on young adults' motivations to engage in environmental management initiatives is a good way forward to enhance their ability to engage. It was found that some environmental groups were willing to invest in student packages to encourage young adults to engage. Creating more flexible opportunities for young adults to get engaged was noted as important. A non-commitment policy for young adults joining an environmental group volunteer list was expressed as a good step forward to better engage young adults in biodiversity management, as they would still be able to stay in the loop and act when they can. Most young adults preferred the idea of being notified of one-offs than joining up to a group and being constantly involved. The majority of young adults were in support of an app that centralised volunteering opportunities for environmental groups across their city, and many environmental groups were also in support of this idea.

A key find to enhancing young adults engagement surrounded the volunteering language used to engage young adults. This research found that young adults connected with the sense of meaningfulness of an initiative and the wider good that it is contributing to. Thus, it was found "the why" of activities need to be better communicated to young adults. Young adults felt discouraged by environmental activities when they felt they activity was not making a difference, or that their input was disposable. Changing the language from 'just get on and do the work' to 'this is why the work is important, and this is how you can help' is key to engaging young adults and increasing the likelihood of them returning.

7. Conclusion

This final chapter summarises and reflects on the key findings of this research, and outlines implications for planning recommendations. It also suggests areas for further research that will enhance knowledge around engaging young adults in biodiversity management initiatives and increase the potential for them to be involved through formal planning processes and community action. The primary aim of this research was to 'explore young adults' levels of understanding of biodiversity in New Zealand and their patterns of engagement in biodiversity management initiatives, including barriers and opportunities to their engagement'. This aim was addressed through three research questions:

1. To what extent are young adults aware of urban biodiversity?
2. What are young adults' understanding and awareness of the biodiversity planning process and strategies to enhance biodiversity?
3. In what ways and to what extent are young adults currently engaging with urban biodiversity, and what are the barriers and opportunities to better their engagement?

7.1 Key Findings

This thesis explored public engagement in biodiversity management initiatives by examining the engagement patterns of young adults, a group which has been identified as largely under-researched in this area (Mayo, 2012). Existing literature on public engagement in biodiversity initiatives have mainly focused on looking at populations as a whole, or targeted older adults or young children and teenagers (Cullen et al., 2016; Fischer and Young, 2007; Lindemann, 2002; Lindemann-Matthies and Bose, 2008; Navarro-Perez and Tidball, 2012; Novacek, 2008; Mayo, 2012; Vodouhê et al., 2010; Freeman, 2005; Kollmuss and Agyeman, 2002; Huang and Lin, 2014). Few existing studies looked young adults in tertiary education, and no studies specifically investigated 18 to 25 year olds in New Zealand (Foley et al., 2018; Arbuthnott and Devoe, 2013; Spash and Hanley, 1995; Nisiforou and Charalambides, 2012). The Department of Conservation has identified young adults as being a vital component in biodiversity management through volunteering. However little is known about young adults current engagement patterns in biodiversity management initiatives (both physical action and engagement with formal planning), the significant barriers to their involvement, and the opportunities to engage this group better.

An online survey consisting of both open-ended and closed questions was developed and advertised at two major New Zealand universities, the University of Otago and Waikato University, and was advertised on social media. The survey instructions specified that respondents should be aged between 18 and 25 years; results from those who fell outside this age bracket were disregarded. A total of 286 survey respondents between the ages of 18-25 years completed the survey. Results are presented in chapters 4 and 5, and provide an insight into the engagement levels of 18 – 25 year olds in New Zealand in relation to biodiversity management initiatives.

Chapter 4 answered **Research Question One: *"To what extent are young adults aware of urban biodiversity?"*** Young adults were largely aware of the concept of biodiversity and were aware of the causes of biodiversity loss, which reflects previous studies on young adults' understanding of biodiversity (Nisiforou and Charalambides, 2012; Foley et al., 2014; Arbuthnott and Devoe, 2013; Spash and Hanley, 1995). Strong awareness of biodiversity correlated with education in environmental subject areas, which showed an information gap for those that are studying non-environmental subjects or not going to university. In addition, young adults identified gaining most of their knowledge from tertiary education, as well as

through social media. However, education on biodiversity does not just have to come from formal education, it can be as simple as increasing the opportunity for direct experiences with biodiversity in the city (Soga and Gaston, 2016).

Chapter 5 answered **Research Question Two: *"What are young adults' understanding and awareness of the biodiversity planning process and strategies to enhance biodiversity?"*** Young adults are largely unaware of biodiversity planning strategies from the international to the local level. Young adults also saw planning documents as uninspiring. Despite not being aware of the majority of planning documents, young adults showed a heightened awareness of the Predator Free 2050 initiative. However, they had strong latent environmental interest and desired to get involved. A straightforward action plan with tangible ways to get involved in biodiversity management was desired by young adults to aid in their engagement. Community environmental groups were largely fragmented, and their work was not closely aligned to existing biodiversity strategies. Rather they worked underneath shared community goals. For young adults this fragmentation meant getting involved in community groups was confusing.

Chapter 6 answered **Research Question Three: *"In what ways and to what extent are young adults currently engaging with urban biodiversity, and what are the barriers and opportunities to better engaging them?"*** Young adults preferred one-off activities as they felt they could not commit to long-term volunteering initiatives. They preferred the idea of an app notifying them of one-off activities, rather than signing up to an environmental group, as in the latter case there was too much pressure to get involved frequently, which young adults felt they could not do. Key informants and survey participants presented barriers to engaging young adults, which included institutional barriers such as poor capacity and lack of resources, to time constraints, transport issues, lack of relevant skills, lack of trust in environmental and government agencies, and lack of faith that biodiversity initiatives are actually making a difference. Key informants expressed that changing the volunteering language from 'just get out and do it' to 'this is why this is meaningful, and this is how you can help' could be a positive shift towards getting more young adults on-board in biodiversity volunteering. Survey participants (young adults) expressed that they wanted to know the tangible outcomes of projects and how they were contributing to wider environmental management. The key findings of all three are shown in Figure 29 (page 134).

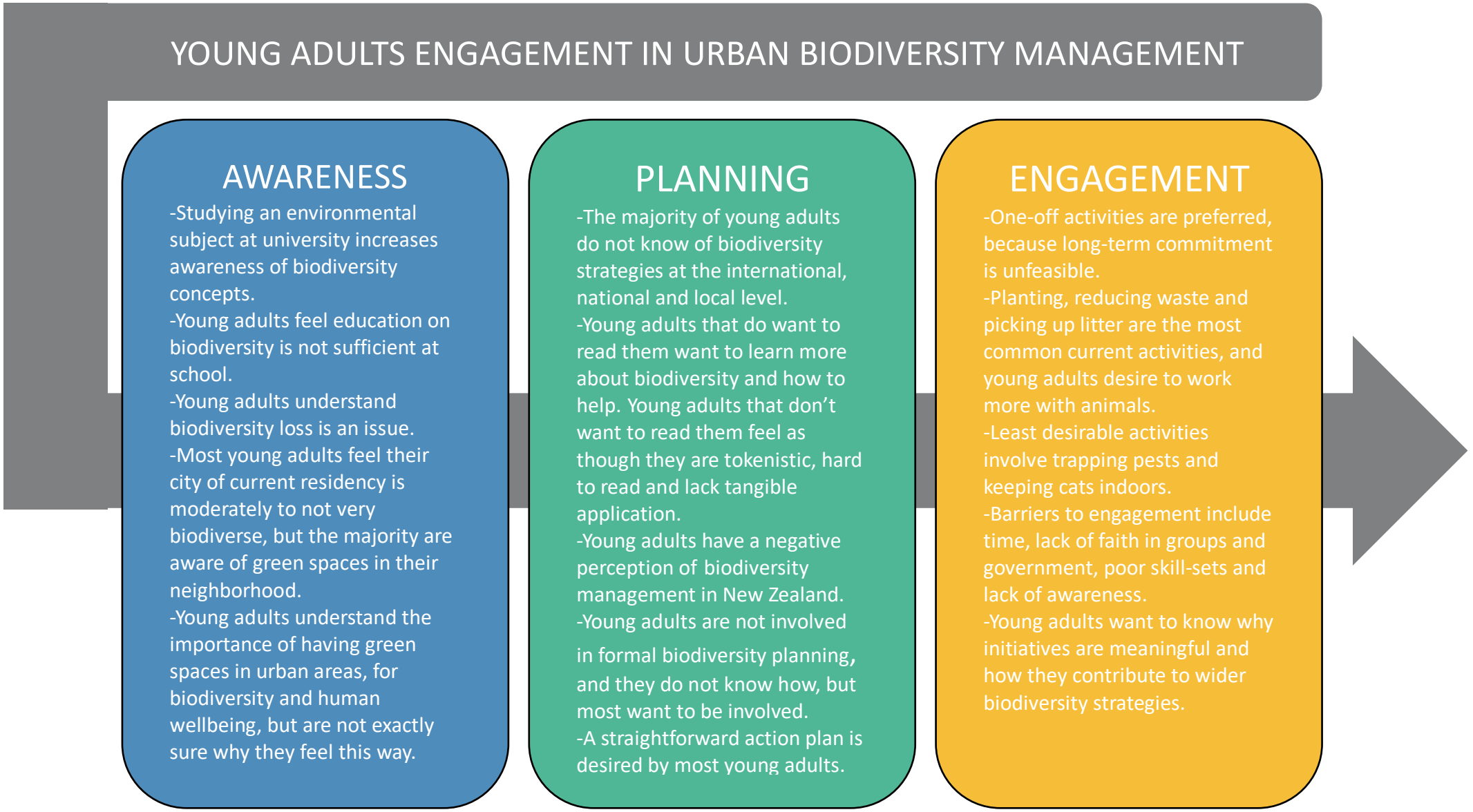

Figure 29: What does young adults' engagement in urban biodiversity management looks like? Source: Author.

7.2 Implications for Planning

Biodiversity loss is one of the largest conservation issues in New Zealand at present, and with climate change this will become a more pressing issue in the future. Young adults with tertiary education are predicted to be the future leaders of biodiversity planning, and thus it is important to explore their current knowledge of biodiversity, perceptions of management, involvement in formal planning and patterns of engagement (Foley et al., 2018). Furthermore, the Department of Conservation emphasises that for on-the-ground biodiversity management to be successful, the contribution of communities and environmental volunteers is essential (DOC, n.d.). With community groups and environmental volunteers being largely made up of adults aged 65 years and up, mobilising young adults to engage in volunteering is important (Peters et al., 2015). Not just for young adults to learn from other volunteers, but to also develop social bonds between younger and older volunteers, and transfer knowledge between the two groups that may have different nature values and environmental outlooks.

Young adults were largely uninvolved in formal biodiversity planning and were not sure how to access the strategies, but had a latent interest in getting involved. A straight-forward, tangible action plan was desired by both those who did not have much interest in environmental strategies and those who did. Knowing how to construct an action plan in the interests of young adults will be beneficial for biodiversity management at a local scale, especially in cities that have large young adult populations. Understanding the ways that young adults want to engage in management and capitalising on the planning direction that young adults want to take will help to link young adults back into community environmental action and the formal planning process (Sterling et al., 2017). It is crucial that engagement outreach and action plans underneath strategies are targeting people in the right way, and encouraging action early on.

7.3 Recommendations

To increase the engagement of young adults in biodiversity management, their awareness of biodiversity, engagement in formal planning and engagement in biodiversity initiatives must be examined. The following recommendations have been developed from this research.

- *Provide greater opportunities for young adults to be educated on biodiversity*

Increasing awareness through better education platforms accessible to all young adults in society, not just those in tertiary education, is needed. The results showed that those who

studied environmental subjects at tertiary education were often more aware of biodiversity and biodiversity loss, than those who had not studied an environmental subject. Increasing the biodiversity education avenues for young adults can be through lectures, experiences and exposure. Increasing young adults' exposure to biodiversity is especially important in urban centers, this can take the form of more urban greening for habitat regeneration including plaques describing the habitat and what kinds of species are attracted to those habitats. Increasing opportunity for an experience with biodiversity may include free shuttles from student hubs to urban ecosanctuaries, or advertising subsidized environmental tours for students through social media. If environmental groups collaborated with the university in setting up environmental experiences within the campus including free public lectures, and biodiversity information days in the middle of campus these steps could help young adults learn more about biodiversity and how it connects to their immediate environment. Through increasing education on the importance of biodiversity and getting involved in its management, more young adults will be involved in formal biodiversity planning. This means young adults will be better represented in formal biodiversity management decision-making and are more aware of engagement opportunities.

- *Develop a tangible action plan (with SMART goals) as part of city council or regional council biodiversity strategies*

A formal action plan should be in place to support local biodiversity objectives, to direct the public (including young adults) to what they can do to help. Ensuring the meaningfulness of initiatives in the bigger picture should be communicated to young adults. Young adults need to be more involved in the formal structure, therefore it needs to be more accessible to be catered to them. Social media is also an important tool that can be used by local councils to increase awareness of plans and the submissions process, therefore it is suggested that local authorities use these platforms as a means to public engagement. Young adults especially liked to know tangible options to engage. With having a predominantly negative view of current biodiversity management it is important that an action plan is in place to show young adults how their involvement would feed into national scale biodiversity targets.

- *Centralise the ability for young adults to engage through an app or volunteer service*

A centralised app was desired by both key informants from environmental groups and by young adults. The fragmentation between community environmental groups, national groups and volunteer agencies makes it difficult for young adults to know exactly where and how to get

involved. The development of an app or website that allows the user to create a 'volunteer profile' and allows the user to set what their volunteer preferences are (such as time and days of service), but that also allows community environmental groups to make profiles and reach out publicly to volunteers will help to centralise biodiversity management activities at the local level and increase the ease of getting volunteers involved.

- *Emphasise the meaningfulness of projects and initiatives*

This study consistently found that young adults wanted to know the wider significance of projects, and how they are actually contributing to the bigger picture. Young adults had a lack of faith in biodiversity management in New Zealand, stating that it was poorly carried out. Showing that a project is contributing should be shown through long-term monitoring of activities work, and model how things have changed over time through volunteer work. This can either be through increased bird counts, carbon-offsetting data or maps showing the increase in habitat cover from community planting.

- *Look into practical responses to overcoming barriers to engagement*

A lack of time, transport and ability to commit to long term projects were some of the main constraints to young adults engaging in environmental initiatives. For environmental groups, providing transport will help, as well as providing non-committal membership to young adults who are time constrained. Young adults were also more interested in engaging in one-off activities, therefore young adults are more likely to sign up to an activity if there is no ongoing commitment.

7.4 Limitations of this research

While these results were based on 286 online survey responses from young adults across New Zealand, this is only a small sample of this age group. In addition to this, those who were more likely to answer were from environmental subject areas. Having a predisposed interest in environmental issues and environmental topics made the survey more enticing to young adults studying an environmental subject. There was also a slight bias towards females in the online survey responses; typically females are more likely to complete an online survey than males (Curtin et al., 2000; Singer et al., 2000).

7.5 Future research

The findings of this research provide a foundation for exploring the relationship between young adults and urban biodiversity management. The scope of this study was largely limited to the young adult population in the centres of Dunedin and Hamilton. However it is important to note that in Dunedin, more than 80% of University of Otago's student population comes from outside of Dunedin. As such, investigation into young adults' involvement in biodiversity management across other cities in New Zealand or a between cities and rural areas may produce different engagement patterns, and nonetheless be an area worth exploring. This research has raised some interesting questions on the source of biodiversity education, and how this information can be accessed by those who are not studying an environmental subject at a tertiary institution. Thus, exploring other avenues to educate young adults on biodiversity loss and management is vital.

Community biodiversity management is largely fragmented, and it is difficult to pinpoint where exactly they are contributing to overarching biodiversity strategies, especially as there is poor resource and information sharing between the groups. For young adults, the fragmentation is a deterrent from getting involved, as it is difficult to see where the work is actually contributing to the bigger picture. Young adults wanted more proof that the work actually makes a difference, thus future research should look into how this can be communicated. The development of a centralised volunteer app would also be worthwhile and would be great to trial in urban centres of New Zealand.

7.6 Concluding argument

Young adults must be better activated to engage in urban biodiversity management through enhancing education, tailoring formal planning to young adults and making environmental initiatives more accessible. The draft biodiversity strategy for 2020 states that a shift in thinking is needed, to focus on empowering communities to take action. And by 'community' they mean all New Zealanders. Thus all New Zealanders need empowering to be stewards of nature, to conserve nature and be encouraged to use it wisely. Through this research it was found that young adults lack awareness of ways to get involved, including not knowing about local strategies for biodiversity management, or ways to get involved with local environmental groups. Other barriers to their involvement have stemmed from their lack of understanding of formal planning. Despite these barriers, young adults have latent interest in the state of the environment and biodiversity regeneration, but turning that interest into meaningful action is

not being facilitated currently. New approaches to engaging this group in formal biodiversity planning and informal biodiversity volunteering will be better achieved through applying this research which explored young adults current knowledge and awareness of biodiversity and its management, engagement patterns, barriers to engagement and motivations to engage.

Reference list

Agyeman, J. and Angus, B., 2003. The role of civic environmentalism in the pursuit of sustainable communities. *Journal of Environmental Planning and Management*, *46*(3), pp.345-363.

Ajzen, I. and Fishbein, M., 1980. Understanding attitudes and predicting social behaviour.

Andersson, E., Tengö, M., McPhearson, T. and Kremer, P., 2015. Cultural ecosystem services as a gateway for improving urban sustainability. *Ecosystem Services*, *12*, pp.165-168.

Arbuthnott, K.D. and Devoe, D., 2014. Understanding of biodiversity among western Canadian university students. *Human Ecology*, *42*(1), pp.147-158.

Aronson, M.F., Lepczyk, C.A., Evans, K.L., Goddard, M.A., Lerman, S.B., MacIvor, J.S., Nilon, C.H. and Vargo, T., 2017. Biodiversity in the city: key challenges for urban green space management. *Frontiers in Ecology and the Environment*, *15*(4), pp.189-196.

Asah, S.T., Guerry, A.D., Blahna, D.J. and Lawler, J.J., 2014. Perception, acquisition and use of ecosystem services: Human behavior, and ecosystem management and policy implications. *Ecosystem services*, *10*, pp.180-186.

Bäckstrand, K., 2003. Civic science for sustainability: reframing the role of experts, policy-makers and citizens in environmental governance. *Global Environmental Politics*, *3*(4), pp.24-41.'

Balestrini, M., Rogers, Y., Hassan, C., Creus, J., King, M. and Marshall, P., 2017. A city in common: a framework to orchestrate large-scale citizen engagement around urban issues. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 2282-2294). ACM.

Bendt, P., Barthel, S. and Colding, J., 2013. Civic greening and environmental learning in public-access community gardens in Berlin. *Landscape and Urban planning*, *109*(1), pp.18-30.

Blake, J., 1999. Overcoming the 'value-action gap'in environmental policy: Tensions between national policy and local experience. *Local environment*, *4*(3), pp.257-278.

Borden, R.J. and Francis, J.L., 1978. Who cares about ecology? Personality and sex differences in environmental concern 1. *Journal of Personality*, *46*(1), pp.190-203.

Boris, S.D. and Krogh, P.G., 2016. Sletten: Rethinking urban habitats through creative management and social engagement. In *Human Smart Cities* (pp. 203-210). Springer, Cham.

Brulle, R.J., 2010. From environmental campaigns to advancing the public dialog: Environmental communication for civic engagement. *Environmental Communication*, *4*(1), pp.82-98.

Brunckhorst, D.J., 2010. Landscapes shaped by people and place institutions require a new conservation agenda. *BioScience*, *60*(8), pp.569-570.

Bryman, A. 2016. *Social research methods,* Oxford, New York, Oxford University Press.

Buta, N., Holland, S.M. and Kaplanidou, K., 2014. Local communities and protected areas: The mediating role of place attachment for pro-environmental civic engagement. *Journal of Outdoor Recreation and Tourism*, *5*, pp.1-10.

Campbell, C. and Jovchelovitch, S., 2000. Health, community and development: Towards a social psychology of participation. *Journal of Community & Applied Social Psychology*, *10*(4), pp.255-270.

Camps-Calvet, M., Langemeyer, J., Calvet-Mir, L. and Gómez-Baggethun, E., 2016. Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning. *Environmental science & policy*, *62*, pp.14-23.

Chandra, A., Miller, C.E., Acosta, J.D., Weilant, S., Trujillo, M. and Plough, A., 2016. Drivers of health as a shared value: mindset, expectations, sense of community, and civic engagement. *Health Affairs*, *35*(11), pp.1959-1963.

Chapman, S. and McNeill, P. (2005) *Research Methods* (3rd Edition). New York, Taylor and Francis.

Couvet, D., Jiguet, F., Julliard, R., Levrel, H. and Teyssedre, A., 2008. Enhancing citizen contributions to biodiversity science and public policy. *Interdisciplinary science reviews*, *33*(1), pp.95-103.

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'neill, R.V., Paruelo, J. and Raskin, R.G., 1997. The value of the world's ecosystem services and natural capital. *nature*, *387*(6630), p.253.

Cullen, R., Hughey, K.F. and Kerr, G.N., 2016. Public perceptions of New Zealand's environment.

Curtin, R., Presser, S., & Singer, E., 2000. The effects of response rate changes on the index of consumer sentiment. *Public Opinion Quarterly* 64: 413–428.

Dale, A., King, L., Behan-Pelletier, V., Bazely, D., Beckel, M., Carr, D., Clermont, H., Clifton-Ross, J., Corsi, M., Eaton, S. and Fast, E., 2019. Biodiversity conservation.

Dean, J., van Dooren, K. and Weinstein, P., 2011. Does biodiversity improve mental health in urban settings?. *Medical hypotheses*, *76*(6), pp.877-880.

Dearborn, D.C. and Kark, S., 2010. Motivations for conserving urban biodiversity. *Conservation biology*, *24*(2), pp.432-440.

de Oliveira, J.P., Balaban, O., Doll, C.N.H., Moreno-Peñaranda, R., Gasparatos, A., Iossifova, D. and Suwa, A., 2011. Cities and biodiversity: Perspectives and governance challenges for implementing the convention on biological diversity (CBD) at the city level. *Biological Conservation*, *144*(5), pp.1302-1313.

Department of Conservation., n.d. Our role. *About Us.* Retrieved from: https://www.doc.govt.nz/about-us/our-role/legislation. Retrieved 5 June 2019.

Department of Conservation., 2000. *New Zealand Biodiversity Strategy.* Wellington: Department of Conservation.

Department of Conservation., 2016. *New Zealand Biodiversity Action Plan.* Wellington: Department of Conservation.

Department of Conservation., 2019. *Te Koiroa o te Koiora: Our shared vision for living with nature.* Wellington: Department of Conservation.

Dunedin City Council., 2007. *A Biodiversity Strategy for Dunedin City.* Dunedin: Dunedin City Council.

Faeth, S.H., Saari, S. and Bang, C., 2001. Urban biodiversity: Patterns, processes and implications for conservation. *e LS*.

Fischer, A. and Young, J.C., 2007. Understanding mental constructs of biodiversity: implications for biodiversity management and conservation. *Biological conservation*, *136*(2), pp.271-282.

Fisher, D.R., Svendsen, E.S. and Connolly, J., 2015. *Urban environmental stewardship and civic engagement: how planting trees strengthens the roots of democracy*. Routledge.

Foley, J., Baijnath, H. and McCracken, D.P., 2018. Understanding Durban University of Technology Students' Perceptions of Biodiversity Loss. *Southern African Journal of Environmental Education*, *34*.

Freeman, C., 2005. Planning for urban nature in New Zealand. In *in Greening the City: Bringing Biodiversity Back into the Urban Environment, proceedings of a conference held by the Royal New Zealand Institute of Horticulture* (pp. 21-24).

Fukuyama, F., 2000. *Social capital and civil society* (No. 0-74). International monetary fund.

Gan, J.E. and Nuli, S., 2018. Millennials' environmental awareness, price sensitivity and willingness to pay for Green Hotels.

Garriga, M., Medina, E., Vives, N. and Itinerarium, F., 2014. An experimental methodology to promote and evaluate the use of community networks for civic engagement. In *8th Annual Development Informatics Association Conference, Port Elizabeth, South Africa*.

Gill, N., Waitt, G. and Head, L., 2009. Local engagements with urban bushland: moving beyond bounded practice for urban biodiversity management. *Landscape and Urban Planning*, *93*(3-4), pp.184-193.

Goddard, M.A., Dougill, A.J. and Benton, T.G., 2010. Scaling up from gardens: biodiversity conservation in urban environments. *Trends in ecology & evolution*, *25*(2), pp.90-98.

Grace, M. and Sharp, J., 2000. Young People's Views on the Importance of Conserving Biodiversity. *School science review*, *82*(298), pp.49-56.

Grace, M.M. and Ratcliffe, M., 2002. The science and values that young people draw upon to make decisions about biological conservation issues. *International Journal of Science Education*, *24*(11), pp.1157-1169.

Greater Wellington Regional Council., 2016. *Biodiversity Strategy.* Wellington: Greater Wellington Regional Council.

Hamilton City Council., n.d. *Environmental Sustainability Strategy.* Hamilton: Hamilton City Council.

Harmsworth, G.R. and Awatere, S., 2013. Indigenous Māori knowledge and perspectives of ecosystems. *Ecosystem services in New Zealand—conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand*, pp.274-286.

Harrison, C. and Davies, G., 2002. Conserving biodiversity that matters: practitioners' perspectives on brownfield development and urban nature conservation in London. *Journal of Environmental Management*, *65*(1), pp.95-108.

Hedblom, M., Heyman, E., Antonsson, H. and Gunnarsson, B., 2014. Bird song diversity influences young people's appreciation of urban landscapes. *Urban Forestry & Urban Greening*, *13*(3), pp.469-474.

Hein, L., Van Koppen, K., De Groot, R.S. and Van Ierland, E.C., 2006. Spatial scales, stakeholders and the valuation of ecosystem services. *Ecological economics*, *57*(2), pp.209-228.

Hewlett, D. and Edwards, J., 2013. Beyond prescription: Community engagement in the planning and management of national parks as tourist destinations. *Tourism Planning & Development*, *10*(1), pp.45-63.

Hines, J.M., Hungerford, H.R. and Tomera, A.N., 1987. Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of environmental education*, *18*(2), pp.1-8.

Hoppner, C. and Whitmarsh, L., 2011. Public engagement in climate action: policy and public expectations. *Engaging the public with climate change. Behavior change and Communication*, pp.47-65.

Hostetler, M., Allen, W. and Meurk, C., 2011. Conserving urban biodiversity? Creating green infrastructure is only the first step. *Landscape and Urban Planning*, *100*(4), pp.369-371.

Huang, H.J. and Lin, Y.T.K., 2014. Undergraduate Students' Attitudes toward Biodiversity. *Universal Journal of Educational Research*, *2*(4), pp.379-386.

Ishwaran, N., 2010. Biodiversity, people and places. *Australasian Journal of Environmental Management*, *17*(4), pp.215-222.

Jones, J.P., Nast, H.J. and Roberts, S.M., 1997. *Thresholds in feminist geography: Difference, methodology, representation,* Lanham: Rowman & Littlefield.

Kadambi, A. and Choi, H., 2010. Civic Engagement and Sustainable Cities. *서울도시연구*, *11*(1), pp.227-243.

Kitchin, R. and Tate, N.J., 2000. *Conducting Research in Human Geography: Theory, Methodology and Practice.* London, Routledge.

Kollmuss, A. and Agyeman, J., 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, *8*(3), pp.239-260.

Korten, D.C., 1996. Civic engagement in creating future cities. *Environment and Urbanization*, *8*(1), pp.35-49.

Kowarik, I., 2011. Novel urban ecosystems, biodiversity, and conservation. *Environmental pollution*, *159*(8-9), pp.1974-1983.

Krasny, M.E. and Tidball, K.G., 2010. Civic ecology: Linking social and ecological approaches in extension. *Journal of Extension*, *48*(1), p.1IAW1.

Krasny, M.E. and Tidball, K.G., 2012. Civic ecology: a pathway for Earth Stewardship in cities. *Frontiers in Ecology and the Environment*, *10*(5), pp.267-273.

Krasny, M.E., Lundholm, C., Shava, S., Lee, E. and Kobori, H., 2013. Urban landscapes as learning arenas for biodiversity and ecosystem services management. In *Urbanization, biodiversity and ecosystem services: Challenges and opportunities* (pp. 629-664). Springer, Dordrecht.

Krasny, M.E., Russ, A., Tidball, K.G. and Elmqvist, T., 2014. Civic ecology practices: Participatory approaches to generating and measuring ecosystem services in cities. *Ecosystem services*, *7*, pp.177-186.

Lewis-Beck, M. S., Bryman, A. & Liao, T. F., 2004. *The Sage encyclopedia of social science research methods,* Thousand Oaks, Calif., Sage.

Lindemann-Matthies, P., 2002. The influence of an educational program on children's perception of biodiversity. *The Journal of Environmental Education*, *33*(2), pp.22-31.

Lindemann-Matthies, P. and Bose, E., 2008. How many species are there? Public understanding and awareness of biodiversity in Switzerland. *Human ecology*, *36*(5), pp.731-742.

Magnusson, E. & Maracek, J., 2015. *Doing interview-based qualitative research : a learner's guide,* Cambridge, Cambridge University Press.

Mason, R.J., 2014. Japan's evolving civic environmentalism. In *Occupy the Earth: Global Environmental Movements* (pp. 37-61). Emerald Group Publishing Limited.

Mayer, F.S. and Frantz, C.M., 2004. The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of environmental psychology*, *24*(4), pp.503-515.

Mayo, G., 2015. 'Nature in the City': young people's perceptions, values and experiences. *Diffusion-The UCLan Journal of Undergraduate Research*, *5*(1).

McDonald, R.I., Kareiva, P. and Forman, R.T., 2008. The implications of current and future urbanization for global protected areas and biodiversity conservation. *Biological conservation*, *141*(6), pp.1695-1703.

McIlrath, L., Farrell, A., Hughes, J., Lillis, S. and Lyons, A., 2009. Mapping civic engagement within higher education in Ireland. *Dublin: AISHE and Campus Engage*.

McPhearson, T., Maddox, D., Gunther, B. and Bragdon, D., 2013. Local assessment of New York City: Biodiversity, green space, and ecosystem services. In *Urbanization, biodiversity and ecosystem services: Challenges and opportunities* (pp. 355-383). Springer, Dordrecht.

Ministry for the Environment., 2018. *Report of the Biodiversity Collaborative Group*. Wellington: Ministry for the Environment.

Ministry for the Environment., 2019. *Environment Aotearoa Report.* Wellington: Ministry for the Environment.

Navarro-Perez, M. and Tidball, K.G., 2012. Challenges of Biodiversity Education: A Review of Education Strategies for Biodiversity Education. *International Electronic Journal of Environmental Education*, *2*(1), pp.13-30.

Niemiec, R.M., Ardoin, N.M., Wharton, C.B. and Brewer, F.K., 2017. Civic and natural place attachment as correlates of resident invasive species control behavior in Hawaii. *Biological Conservation*, *209*, pp.415-422.

Nilon, C.H., 2011. Urban biodiversity and the importance of management and conservation. *Landscape and ecological engineering*, *7*(1), pp.45-52.

Nisbett, G.S. and Strzelecka, M., 2017. Appealing to Goodwill or YOLO-Promoting Conservation Volunteering to Millennials. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, *28*(1), pp.288-306.

Nisiforou, O. and Charalambides, A.G., 2012. Assessing undergraduate university students' level of knowledge, attitudes and behaviour towards biodiversity: a case study in Cyprus. *International Journal of Science Education*, *34*(7), pp.1027-1051.

Norton, D.A., 2000. Conservation biology and private land: shifting the focus. *Conservation Biology*, *14*(5), pp.1221-1223.

Novacek, M.J., 2008. Engaging the public in biodiversity issues. *Proceedings of the National Academy of Sciences*, *105*(Supplement 1), pp.11571-11578.

Olsen, V., Galloway Jr, G.E. and Ruth, M., 2018. The Demographics of Public Participation Access When Communicating Environmental Risk. *Human Ecology Review*, *24*(1).

Omoto, A.M. and Packard, C.D., 2016. The power of connections: Psychological sense of community as a predictor of volunteerism. *The Journal of social psychology*, *156*(3), pp.272-290.

O'Riordan, T. and Stoll-Kleemann, S., 2002. Deliberative democracy and participatory biodiversity. *Biodiversity, sustainability and human communities: Protecting beyond the protected*, pp.87-112.

Otago Regional Council., 2018. *Our Living Treasure | Tō tatou Koiora Taoka.* Dunedin: Otago Regional Council.

Paavola, J., Gouldson, A. and Kluvánková-Oravská, T., 2009. Interplay of actors, scales, frameworks and regimes in the governance of biodiversity. *Environmental Policy and Governance*, *19*(3), pp.148-158.

Peters, M.A., Hamilton, D. and Eames, C., 2015. Action on the ground: a review of community environmental groups' restoration objectives, activities and partnerships in New Zealand. *New Zealand Journal of Ecology*, *39*(2), pp.179-189.

Pienaar-Steyn, S., 2012. The millennium development goals as a conceptual framework for enabling and evaluating community engagement. *South African Review of Sociology*, *43*(2), pp.40-57.

Prugh, T. and Renner, M., 2014. A call to engagement. In *State of the World 2014* (pp. 241-252). Island Press, Washington, DC.

Pyle, R.M., 1993. The thunder tree. *Armbrecht-Forbes, A., Forbes, P., &*.

Ramsay, G., Dodds, R., Furtado, D., Mykhayletska, Y., Kirichenko, A. and Majedian, M., 2017. The Barriers to Millennials Visiting Rouge Urban National Park. *Sustainability*, *9*(6), p.904.

Reed, M.S., Vella, S., Challies, E., de Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., Neumann, R.K., Oughton, E.A., Sidoli del Ceno, J. and van Delden, H., 2018. A theory of participation: what makes stakeholder and public engagement in environmental management work?. *Restoration ecology*, *26*, pp.S7-S17.

Resource Management Act., 1991. No 69. Wellington: Ministry for the Environment.

Rival, L.M., 2011. *Anthropological encounters with economic development and biodiversity conservation* (No. qehwps186). Queen Elizabeth House, University of Oxford.

Rudd, H., Vala, J. and Schaefer, V., 2002. Importance of backyard habitat in a comprehensive biodiversity conservation strategy: a connectivity analysis of urban green spaces. *Restoration ecology*, *10*(2), pp.368-375.

Ruru, J., O'Lyver, P.B., Scott, N. and Edmunds, D., 2017. Reversing the decline in New Zealand's biodiversity: empowering Māori within reformed conservation law. *Policy Quarterly*, *13*(2).

Sadler, J., Bates, A.D.A.M., Hale, J.A.M.E.S. and James, P.H.I.L.I.P., 2010. Bringing cities alive: the importance of urban green spaces for people and biodiversity. *Urban ecology. Cambridge University Press, Cambridge*, pp.230-260.

Sanderson, S.E. and Redford, K.H., 2003. Contested relationships between biodiversity conservation and poverty alleviation. *Oryx*, *37*(4), pp.389-390.

Sarantakos, S., 1998. Social research, Basingstoke, Hampshire: Macmillan.

Savard, J.P.L., Clergeau, P. and Mennechez, G., 2000. Biodiversity concepts and urban ecosystems. *Landscape and urban planning*, *48*(3-4), pp.131-142.

Scannell, L. and Gifford, R., 2010. The relations between natural and civic place attachment and pro-environmental behavior. *Journal of environmental psychology*, *30*(3), pp.289-297.

Schewenius, M., McPhearson, T. and Elmqvist, T., 2014. Opportunities for increasing resilience and sustainability of urban social–ecological systems: insights from the URBES and the cities and biodiversity outlook projects. *Ambio*, *43*(4), pp.434-444.

Seymour, V.I. and Haklay, M., 2017. Exploring engagement characteristics and behaviours of environmental volunteers. *Citizen Science: Theory and Practice*, *2*(1).

Shwartz, A., Cosquer, A., Jaillon, A., Piron, A., Julliard, R., Raymond, R., Simon, L. and Prévot-Julliard, A.C., 2012. Urban biodiversity, city-dwellers and conservation: How does an outdoor activity day affect the human-nature relationship?. *PLoS One*, *7*(6), p.e38642.

Silva, P. and Krasny, M.E., 2016. Parsing participation: models of engagement for outcomes monitoring in urban stewardship. *Local Environment*, *21*(2), pp.157-165.

Singer, E., van Hoewyk, J., & Maher, M. P., 2000. Experiments with incentives in telephone surveys. *Public Opinion Quarterly* 64: 171–188.

Soga, M. and Gaston, K.J., 2016. Extinction of experience: the loss of human–nature interactions. *Frontiers in Ecology and the Environment*, *14*(2), pp.94-101.

Statistics New Zealand., n.d. *Subnational Population Estimates.* Retrieved from http://archive.stats.govt.nz/browse_for_stats/population/estimates_and_projections/subnational-population-estimates-info-releases.aspx. Retrieved 7 June 2019.

Steelman, T.A., 2002. Community-based involvement in biodiversity protection in the United States. *Biodiversity, sustainability and human communities: protecting beyond the protected. Cambridge University Press, Cambridge, United Kingdom*, pp.142-167.

Steinberg, P.F., 2009. Institutional resilience amid political change: the case of biodiversity conservation. *Global Environmental Politics*, *9*(3), pp.61-81.

Sterling, E.J., Betley, E., Sigouin, A., Gomez, A., Toomey, A., Cullman, G., Malone, C., Pekor, A., Arengo, F., Blair, M. and Filardi, C., 2017. Assessing the evidence for stakeholder engagement in biodiversity conservation. *Biological Conservation*, *209*, pp.159-171.

Sultana, F., 2007. Reflexivity, positionality and participatory ethics: Negotiating fieldwork dilemmas in international research. *ACME: An international E-journal for Critical Geographies*, *6*(3), pp.374-385.

Taylor, L. and Hochuli, D.F., 2015. Creating better cities: how biodiversity and ecosystem functioning enhance urban residents' wellbeing. *Urban ecosystems*, *18*(3), pp.747-762.

Tolich, M. and Davidson, C. eds., 2018. *Social science research in New Zealand*. Auckland University Press.

United Nations Environment., n.d. *Convention on Biological Diversity.* Retrieved from https://www.cbd.int. Retrieved 7 June 2019.

van den Born, R.J., Arts, B., Admiraal, J., Beringer, A., Knights, P., Molinario, E., Horvat, K.P., Porras-Gomez, C., Smrekar, A., Soethe, N. and Vivero-Pol, J.L., 2018. The missing pillar: Eudemonic values in the justification of nature conservation. *Journal of Environmental Planning and Management*, *61*(5-6), pp.841-856.

van Weelie, D. and Wals, A., 2002. Making biodiversity meaningful through environmental education. *International Journal of science education*, *24*(11), pp.1143-1156.

Verboom, J., van Kralingen, R.B.A.S. and Meier, U., 2004. *Teenagers and biodiversity-worlds apart?: an essay on young people's views on nature and the role it will play in their future*. Alterra.

Vodouhê, F.G., Coulibaly, O., Adégbidi, A. and Sinsin, B., 2010. Community perception of biodiversity conservation within protected areas in Benin. *Forest Policy and Economics*, *12*(7), pp.505-512.

Voß, J.P. and Amelung, N., 2016. Innovating public participation methods: Technoscientization and reflexive engagement. *Social Studies of Science*, *46*(5), pp.749-772.

Waikato Regional Council., 2016. *Local Indigenous Biodiversity Strategy (LIBS) Pilot Project: Source to the Sea.* Hamilton: Waikato Regional Council.

Wells, N.M. and Lekies, K.S., 2006. Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children Youth and Environments*, *16*(1), pp.1-24.

Wilson, K.A., Auerbach, N.A., Sam, K., Magini, A.G., Moss, A.S.L., Langhans, S.D., Budiharta, S., Terzano, D. and Meijaard, E., 2016. Conservation research is not happening where it is most needed. *PLoS Biology*, *14*(3), p.e1002413.

Zerbe, S., Maurer, U., Schmitz, S. and Sukopp, H., 2003. Biodiversity in Berlin and its potential for nature conservation. *Landscape and urban planning*, *62*(3), pp.139-148.

Zipperer, W.C. and Pickett, S.T., 2001. Urban Ecology: patterns of population growth and ecological effects. *e LS*.

Appendix 1: Information Sheet for Interview Participants

YOUNG ADULTS ENGAGEMENT IN URBAN BIODIVERSDITY MANAGEMENT
INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, we thank you. If you decide not to take part, there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

The aim of this project is to explore the extent to which young adults are engaging in urban biodiversity management. The major aims of the project are to identify the barriers to getting young adults involved and if there are potential opportunities to bettering our biodiversity management functions to make urban biodiversity conservation more accessible to young adults. This project is being undertaken as part of the requirements for Alice Falloon's Master of Planning qualification.

What Types of Participants are being sought?

The research seeks to gather the perspectives of at least 200 students between the ages of 18 and 25 through a survey, on the way urban biodiversity is managed in New Zealand, biodiversity strategies, their value of urban biodiversity and their views on engaging in biodiversity initiatives. Interviewees from environmental groups, local government, central government and volunteer organisations are also sought.

What will Participants be asked to do?

Should you agree to take part in this project, you will be asked to participate in a semi-structured interview, either as an individual or as part of a group or fill out a survey. You will be asked questions on the topics of environmental engagement, volunteering, biodiversity management and the state of New Zealand's biodiversity, biodiversity in your city and how you value environmental engagement. The interviews will not exceed the duration of one hour. The interviews will also be audio recorded. If at any stage you feel uncomfortable, you may decline to answer any question, or request that the interview be terminated. The information gathered from the research will be made available to participants on request.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself.

What Data or Information will be collected and what use will be made of it?
Responses to interview questions will be used as primary data and information collected to supplement the survey data and inform the researcher of the differing perspectives young adults

have on biodiversity management and engaging in it. The information gathered will help to answer questions that environmental groups have around the motivations and barriers to young adults' engagement in urban biodiversity management and may aid local governments and environmental groups to better create strategies that cater to involving more groups in civic-led environmental planning initiatives.

Only the student researcher and supervisor will have access to the audio recordings and transcriptions. The raw data will be kept on password protected computers and where necessary, in a locked cabinet within the supervisor's office. Data obtained as a result of the research will be retained for **at least 5 years**. Any personal data collected on the participant will be destroyed at the completion of the research.

The results of the project may be published, and every effort will be made to preserve your anonymity, unless you wish to be named, or hold a position within the community where due to the nature of the research, may be difficult to do so. If you would like to attribute your contributions, there is a section at the end of the consent form where you can give permission to release your personal details, such as your name and which organisation or group you are affiliated to. It is absolutely up to you which of these options you prefer.

As mentioned in the above section the interviews are semi-structured. This means the project involves an open-questioning technique. The general line of questioning includes young adults and engagement in urban biodiversity management in your community and views of current biodiversity initiatives. The precise nature of the questions that will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently, although the School of Geography is aware of the general areas to be explored in the interview, the Committee has not been able to review the precise questions to be used.
In the event that the line of questioning does develop in such a way that you feel hesitant or uncomfortable, you are reminded of your right to decline to answer any particular question(s).

The independent report will be available to all participants to view at the completion of the project. Any processed data outside of the individual's personal contributions will not be able to be viewed before this date.

Can Participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time before the 30th of May 2018 and without any disadvantage to yourself.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:-

Alice Falloon
Department of Geography
falal591@student.otago.ac.nz

and

Claire Freeman
Department of Geography
cf@geography.otago.ac.nz

This study has been approved by the Department stated above. However, if you have any concerns about the ethical conduct of the research you may contact the University of Otago Human Ethics Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix 2: Online Survey Questions (taken from SurveyMonkey survey)

Young Adults and Biodiversity Management

- Created 13/04/2019
- Closed 12/07/2019

Page 1: Welcome to my survey!

Thank you for participating in this survey on young adults and biodiversity management. If you complete this survey you will be in the draw to win 1 of 3 $100 New World Vouchers. Your responses are important and will be used to contribute to the completion of a Master's Thesis within the Master of Planning Programme at the University of Otago. The goal of this survey is to examine young adults' perceptions of and engagement levels with urban biodiversity planning and management.

Thank you very much, please click NEXT to continue to the survey.

Page 2: Getting to know you!

Q1. What is your age?
Q2. What is your occupation? (if applicable)
Q3. What is your study area? (if student)
Q4. What is your gender?
Q5. What ethnicity do you identify as?
Q6. Please state your iwi if you identified as Māori or mixed Māori.
Q7. What is your living situation?
Q8. Where did you spend the most time growing up?
Q9. Name of the town/city you spent the most time growing up in.
Q10. Which town/city do you currently live in?

Page 3: Knowledge of Biodiversity.

Q11. Have you ever heard of the term 'biodiversity'?

- Yes, and I know what it means.
- Yes, but I am vague about the meaning.
- No, never heard of it.

Q12. How important do you think it is to have green spaces to support a diversity of plant and animal species?

- Extremely important.
- Very Important.
- Somewhat Important.
- Not at all important.

Q13. Do you think that New Zealand's biodiversity is under threat?

- Yes
- No

Q14. What do you think are the top five challenges for New Zealand's biodiversity? (choose 5 from below)

- Predators.
- Urban Growth.
- Climate Change.
- Plastics and Waste.
- Farming.
- Poor education to help the public take care of biodiversity.
- Poor management strategies.
- Deforestation.
- Housing Developments.
- Air Pollution.

Q15. How biodiverse do you think your town/city is (the one which you currently reside in)?

- Exceptionally.
- Very.
- A moderate amount.
- Not very.
- Not at all.
- I don't know.

Q16. How much funding should be allocated to biodiversity protection in the governmental annual budget?

- 1 Billion (Equivalent to current education funding).
- 600 Million.
- 300 Million.
- 100 Million.
- 50 Million (Equivalent to current arts, culture and heritage funding).
- 10 Million.

Q17. What kind of biodiversity management projects should be prioritised in terms of funding?

- Re-introduction of animals and plants into modified landscapes (e.g. more native planting and habitat creation in cities).
- National Park Wildlife protection.
- Urban eco-sanctuary funding (e.g. Orokonui, Zealandia, Mangatautari).
- Biodiversity management on public land (e.g. public parks).
- Supporting community biodiversity groups.
- Green infrastructure aid for developers.
- Biodiversity management on private land (e.g. your home garden).

Q18. Which of the following would you consider doing to help increase biodiversity in your city?

- Reduce my waste.
- Plant native species.
- Support council biodiversity plans.
- Pick up litter.
- Grow shrubs and plants
- Provide food for birds.
- Not use pesticides.
- Be a part of community planting days.
- Create a habitat garden in my backyard (i.e. rocks for lizards, invertebrate homes).
- Trap pest species.
- Keep my cat inside.
- Join an environmental group.

- Donate money to nature conservation groups in my community.
- Not own a cat.

Q19. Is there anything that you do now to support or maintain biodiversity? E.g. planting, picking up litter, donating to environmental groups etc. Please explain. (Open-ended question).

Q20. To what extent do you agree with the following statements
- "To have rich biodiversity in a city there needs to be plenty of green space".
- "Having a lot of biodiversity in cities if vital or the health and wellbeing of those who live in them".
- "The New Zealand Government is doing a great job at funding conservation of natural environments".

Page 4: Your engagement with urban biodiversity

Q21. Are you part of an environmental group?
- Yes
- No

Q22. What is stopping you from being part of an environmental group? Tick all that apply. (If you said yes to question 21 skip to question 23).
- I don't have enough time.
- I haven't been made aware of any groups in my area.
- I don't have reliable transport options.
- I would rather be paid for my labour hours.
- I don't have that much interest in nature.
- Environmental groups are unorganised.
- They are uninviting, unconvincing and uninteresting.
- They cost too much.
- My contribution doesn't actually do anything g to help the environment in the grand scheme so there is no point.
- I don't personally get anything out of it.
- It is a waste of time.
- Other (please specify).

Q23. What made you join your group? Tick all that apply. (If you said no to question 21 skip to question 24).
- I am an environmental enthusiast.
- It makes me feel good that I am contributing to the greater good.
- It gets me out in nature which makes me feel good.
- It gets me out of the house and exploring more of my area.
- I like to meet new people / like-minded people.
- Other (please specify).

Q24. How involved do you think the majority of young adults are in biodiversity management?

Q25. Do you follow any environmental groups on social media?
- Yes
- No

Q26. Do you follow any of the following on social media?
- Your university.
- The Department of Conservation.

- David Attenborough.
- Jacinda Ardern.
- Greenpeace.
- Your local council.
- Jane Goodall.
- The United Nations.

Q27. Which of the following would make you more likely to join an environmental group? (please choose your top four).

- Ability to do it with a group of friends.
- More proof that the work actually makes a difference.
- Definite opportunities to get up close with animals.
- Integration of environmental activity with other activities such as a social event like a wildlife touror an after-activity wine and cheese.
- Consistent group meeting times.
- Guaranteed transport to and from.
- Guarantee of a great reference for your CV.
- Food and beverages provided.
- Getting paid or getting vouchers.
- A group of varied ages.
- Knowing the group will just be people between 18-25 years old.
- Other (please specify).

Q28. Please rank the following urban conservation strategies from the most appealing to least appealing activities to get involved in.

- Working directly with the feeding and rehabilitation of animals.
- Animal habitat construction.
- Neighbourhood tree planting.
- Stream restoration.
- Track and fence maintenance in urban ecological sanctuaries or national parks.
- Trapping for pests.
- Environmental activism.

Q29. Would you like to see more native species in your city within the next 10 years?

- Yes.
- No.
- I don’t care.

Q30. Would you support the development of an urban biodiversity strategy or app that helps connect young people to environmental groups or activities in their area?

- Yes
- No

Q31. Do you think young adults of today will take stronger environmental action as leaders in comparison to current leaders?

- Yes
- No

Q32. Do you think having the public be a part of biodiversity and nature management is important?

- Yes
- No

Q33. Do you think environmental education that demonstrates the importance of biodiversity for human life is prominent enough in school?

- Yes, it is great.
- Yes, it is okay.
- I am neutral.
- No, it could be better.

Q34. Do you think environmental groups need to be more accessible?

- Yes
- No

Q35. Which would you be more interested in?

- Being notified when there are one-off opportunities to be part of an initiative / environmental activity.
- Being part of an ongoing environmental group or society.

Q36. Would you like to see wild kiwis in your backyard in the next 15 years?

- Of course.
- Don't have an opinion.
- No.

Page 5: Biodiversity Planning

Q37. Have you ever heard of the International Convention on Biodiversity?

- Yes and I know what it is.
- Yes, but I don't know what it is.
- No.

Q38. Have you ever heard of the New Zealand Biodiversity Strategy?

- Yes and I know what it is.
- Yes, but I don't know what it is.
- No.

Q39.Have you ever heard of the Predator Free 2050 Initiative?

- Yes and I know what it is.
- Yes, but I don't know what it is.
- No.

Q40. Are you aware of any local biodiversity management strategies that your local council has adopted?

- Yes, I am aware and know what they seek to do
- No, I am not aware.

Q41. If you answered 'yes and I know what it is' to any of the above, how did you find out about it/them? (Open-ended question).

Q42. Do you think you would ever read a biodiversity management strategy?

- Yes (go to Question 43).
- No (go to Questi0on 44).

Q43. If yes, why? (Open-ended question).

Q44.If no, why? (Open-ended question).

Q45.Do you think it is the job of the Department of Conservation, local-council or local groups to organise local conservation initiatives?

- Council.
- Department of Conservation.
- Community.
- Other (please specify).

Q46. If you could influence planning to increase the amount of green space in your city, which would you like to see more of?

- Rooftop greening and gardens.
- More street trees.
- More hands-on public participation in the planning of green spaces.
- More flowers and gardens.
- Eco buildings.
- Interactive green spaces.
- Increased garden to house ratio.
- More street planting in highly concrete areas.
- More urban nature walks.
- More habitat development for animals.
- More urban eco-sanctuaries.
- Monthly neighbourhood planting days.
- More sports parks.

Q47. Do you think making more green spaces in cities that provide habitats for plants and animals will also increase peoples' wellbeing and happiness?

- Yes of course it will.
- Yes, I think so, but I don't know why.
- No, I don't think so but I don't know why.
- No, I don't see how increasing animal habitats in cities influence people's wellbeing.

Page 6: Use of public urban green spaces

Q48. Please indicate how much you enjoy spending time in green spaces in your city.

- A great deal – I enjoy it.
- A lot.
- A moderate amount.
- A little.
- Not at all – don't really enjoy it.

Q49. Are you satisfied with the amount of green space provided in your city?

- Very satisfied.
- Satisfied.
- Neither satisfied or dissatisfied.
- Dissatisfied.
- Very dissatisfied.

Q50. Are you aware of green spaces around your neighbourhood?

- Yes (skip Question 51).
- No (go to Question 51).

Q51. I am not aware of green spaces in my neighbourhood because… (if relevant).

- Busy with work and home so have not paid much attention to my surroundings.
- I am new to this area.
- I am an indoor person and have not really ventured out to the green spaces.
- There is none.
- I prefer my own backyard.
- Other (please specify).

Q52. Do you often visit or pass through green spaces in your neighbourhood?

- Yes (skip Question 53).
- No (go to Question 53).

Q53. I do not visit or pass through green spaces in my neighbourhood because… (if relevant).

- I have no time.
- The green space is out of the way.
- The green space near me is not appealing.
- I feel unsafe being there.
- I am an indoor person.
- I prefer my own backyard.
- It is inaccessible.
- I am afraid of insects and animals there.
- I am not keen on greenery / nature.
- Other (please specify).

Q54. What do you often do in green spaces in your city?

- Relax.
- Spend time with friends and family.
- Exercise.
- Take photos.
- Watch birds.
- Take pets out.
- Play sports.
- Look for animals.
- Mediate.
- Planting.
- Other (please specify).

Page 7: What nature means to you

Q55. When I was young (up to 16 years old)…

- Playtime was mostly in green spaces (bush, fields, vacant lots and wetlands, streams, rivers, lakes).
- I spent a lot of time in my neighbourhood playground or park.
- I spent time in my garden and or in the school community garden.
- I frequented national parks.
- I was involved in outdoor sports / activities.
- My family instilled the importance of being in nature.

Q56. How important is it for you that, near your home…

- There is green space for physical activity.
- There is green space for social activity.
- There is green space for relaxation.
- There are green walking and biking paths.

- There is biodiversity and wildlife around.

Q57. For each of the statement below please rate the extent to which you agree

- Some species are just meant to die out or become extinct.
- Humans have the right to use natural resources any way we want.
- I always think about how my actions effect the environment.
- I am very aware of environmental issues.
- I take notice of wildlife wherever I am.
- Nothing I do will change the problems in other places on the planet.
- Conservation is unnecessary because nature is strong enough to recover from human impacts.
- I think a lot about the suffering of animals.

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Thank you for participating in this survey!